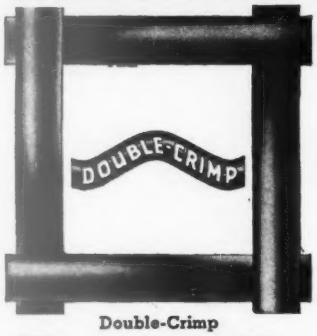
PIT AND QUARRY

DECEMBER, 1946

With all Good Wishes for Christmas and the New Year

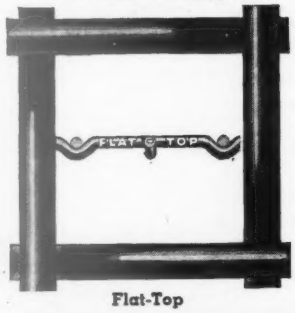
PIT AND QUARRY



Double-Crimp

Arch-Crimp

Intermediate-Crimp



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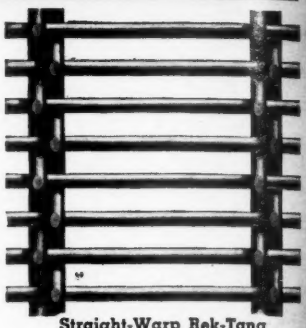
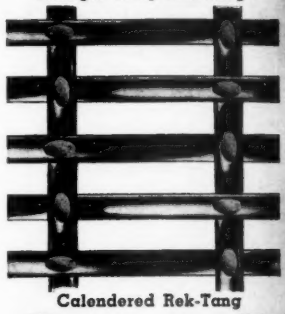
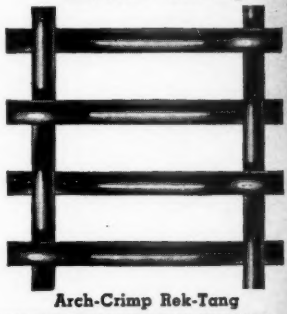
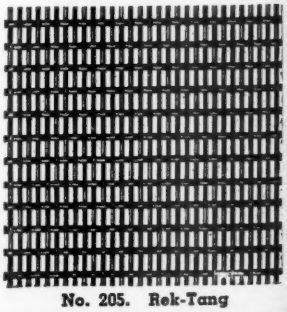

Straight-Warp Rek-Tang


Calendered Rek-Tang


Arch-Crimp Rek-Tang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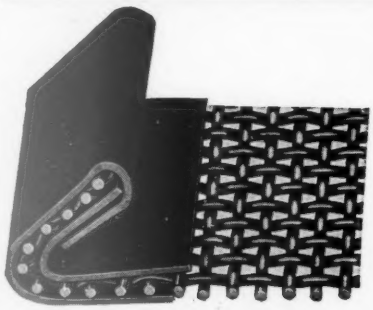

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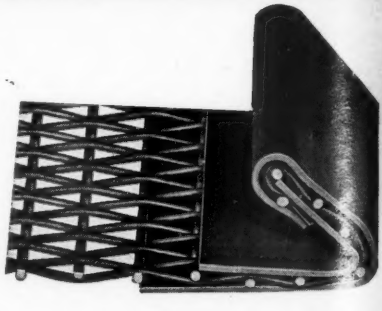

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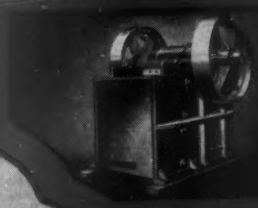
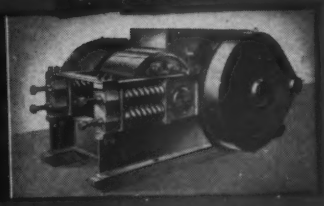
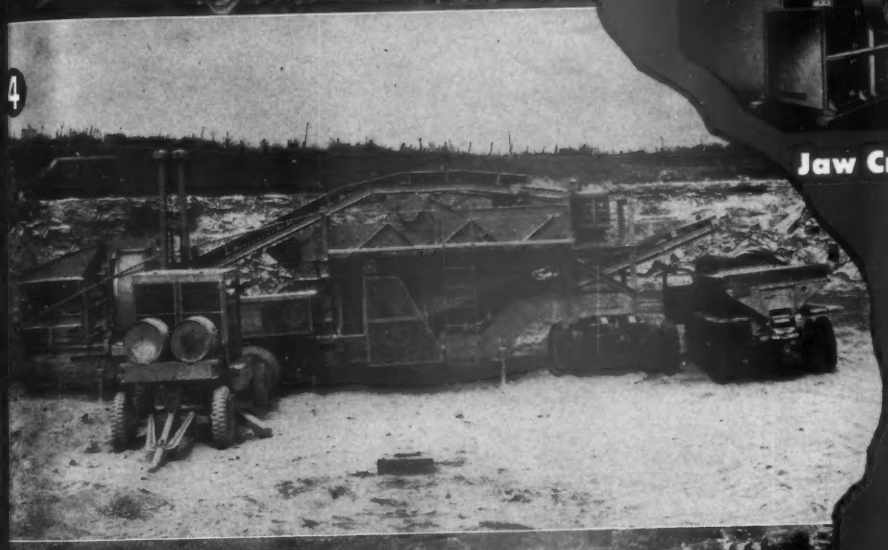
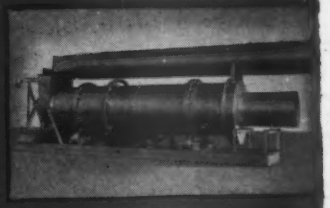


Jaw Crushers



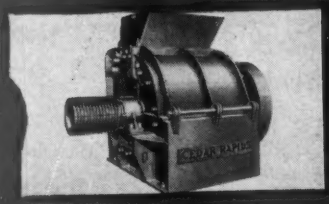
Roll Crushers



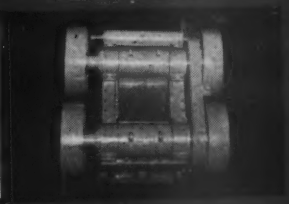


Driers

Pug Mills

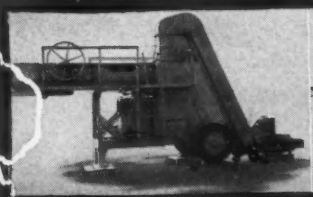


Hammermills

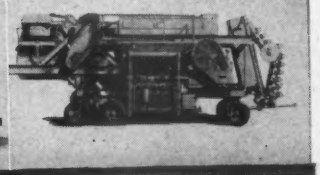


Twin Jaw Crushers

COMPANY



Patchmaster Asphalt Plant



Model "F" Asphalt Plant

PIT AND QUARRY

December, 1946

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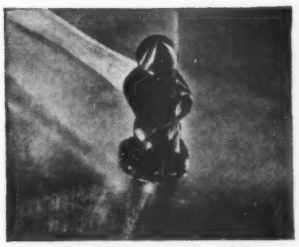
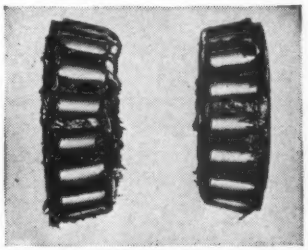


"Hammer Test" proves Marfak protects parts longer

"Stretch Test" proves Marfak seals out dirt and moisture

And see how *Marfak* s-t-r-e-t-c-h-e-s. Ordinary grease won't do that. But *Marfak* is cohesive. It holds together. That means it seals out dirt and moisture — protects chassis parts for extra thousands of miles.



Marfak Heavy Duty makes wheel bearings last longer

Use a lubricant that adds life to wheel bearings — TEXACO MARFAK HEAVY DUTY. Despite heavy loads and high speeds, *Marfak Heavy Duty* stays in the bearings. It provides fluid lubrication inside, but retains its original consistency at the edges — thus sealing out dirt and moisture, sealing itself in, assuring safer braking. No seasonal change is required.

More than 250 million pounds of Marfak have been used!

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EDITORIAL

Exit OPA—Enter Free Competition?

YIELDING at last to the pressure of public opinion against artificial shortages, bottlenecks, black markets and the multitude of other evils resulting from the ineffective administration of wage and price controls, President Truman on November 9 issued a sweeping order removing such controls from all services and commodities with a few exceptions. Controls were retained only on rents, rice, sugar and certain sugar products, leaving the country nearly free of OPA ceilings for the first time since early 1942. This action was taken four days after the election which saw Republicans win control of the House and Senate after a campaign based on the removal of controls, and after an avalanche of decontrol actions which came too late to influence many voters.

According to the President "the law of supply and demand operating in the market place will, from now on, serve the people better than would continued regulation of prices by the Government." While rent ceilings were retained he said, "It may be that some adjustments of rents will be required." With regard to wages and salaries President Truman said that labor and management have the responsibility alone now for the "adjustment of their differences without interruption of production."

Price Administrator Paul Porter of the OPA, since resigned, at once announced that this much-criticized agency "is proceeding immediately with liquidation of its pricing functions." Industry was warned, however, to preserve for a year from the date of the "decontrol of the commodity all records, reports and other documents that they were required to maintain to the time of decontrol" as proof of their compliance with the law when it was in effect. It is believed that the remnants of the OPA and the CPA will be combined under a single new agency, which will be announced later.

Chairman W. Willard Wirtz announced that the National Wage Stabilization Board's functions will be wound up and its offices closed as quickly as possible. The enforcement of wage violation cases by tripartite Regional Wage Stabilization Boards will end January 15. While the WSB has nothing more to say about wages, it still has some 6,700 cases of alleged wage control violations pending and these must be decided. Mr. Wirtz also indicated that the few remaining functions of the WSB will be transferred to some other appropriate agency after that date.

CONTRACTORS and the manufacturers of building materials were freed from restrictions as to prices and wages but, although general priority controls including allocations of materials may soon be discarded, the Civilian Production Administration under Housing Expediter Wilson Wyatt warns that it will maintain priorities and allocations for channelling materials and equipment into housing, maintain limitations on non-residential construction, and continue to enforce the present ceilings of $10,000 on new homes and rental rates of $80 per month on new houses and apartments for veterans. Premium payments to manufacturers of scarce materials and guaranteed marketing plans for prefabricators also will remain in effect. Only Presidential or Congressional action can remove these controls.

The immediate reaction of labor leaders was that the action would not tend to increase strikes. Industrial leaders, however, believe that more wage increases are inevitable and that these will force some price increases. From here there appears to be no betterment in the general strike situation which is now the major factor holding back prosperity and delaying the production of the many things we need. An aroused public opinion should force Congress to take quick and drastic action and it is to be hoped that this will at least include amendments to the Wagner Act which will also make its obligations binding on unions and not on employers alone. Even the most rabid anti-laborite, however, does not want an elaborate governmental setup for settling labor disputes which would again subject industry to bureaucratic supervision and regulation.

While the prevailing opinion among industrial leaders appears to be that there will be some increases in prices it is generally believed that these will level off and in many cases drop as increasing supplies create a buyers' market. The recent decontrol of meat and the ensuing rise and fall of prices is a good illustration of the fact that the American consumer is fully capable of taking care of profiteers who attempt to reap quick and big profits on items in short supply. The effectiveness of this brake was also demonstrated after the first World War when runaway prices dropped sharply as people quit buying.

THERE will be no price catastrophe as a result of decontrol if we keep our heads and go to work. The reputable businesses of this country, and these are predominant, are just as interested in bringing prices down to a reasonable level as the man on the street. They are in business on a permanent basis and have found through long experience that their prosperity and that of this country is based on the ability of our industries to produce large quantities of good materials at the lowest possible price consistent with a reasonable profit. Also they have no desire to create conditions which might again bring on government regulation. The general policy of the producers of building materials is evident from even a cursory study of their price curves over a period of years, which show only slight fluctuations from year to year and only slight increases over longer periods as compared to other commodities. Free competition will not permit exorbitant prices to exist for any length of time, and in a country with our resources and ingenuity suitable substitutes can be found for almost anything if the need is urgent enough.

Producers of nonmetallic minerals are warned that, while their industries have been freed from wage and price controls, they still face other controls which could have a drastic effect. Industrial construction and public works can and may be discouraged or prohibited, and the aggregates, cement, and ready-mixed concrete industries in particular cannot operate economically in a strictly home-building market. The entire construction industry is also geared to a well-rounded building program. The uncertainty of the construction picture, along with wage and strike problems, equipment and material shortages, railroad car shortages, etc., will continue to make life interesting for nonmetallic minerals producers.

Sand-Gravel Price Control Ended on November 9 by Decree of Pres. Truman

Efforts of the National Sand and Gravel Association to obtain decontrol of sand and gravel from the Office of Price Administration came to an unexpected end when President Truman on November 9 abolished all price and wage controls, with the exception of those on rents, sugar and rice.

The association had recently opened negotiations with the OPA for the formation of an advisory committee for the sand and gravel industry which was to promote decontrol.

Vincent Ahearn Attends International Conference

On November 20, Vincent P. Ahearn, executive secretary of the National Sand and Gravel Association, Washington, D. C., boarded a Lockheed Constellation plane at the Washington airport enroute to the International Labor Organization conference in Brussels, Belgium, from November 25 to December 3. Mr. Ahearn is one of the two members representing employers of the United States at a meeting of the Building, Civil Engineering and Public Works Committee of the International Labor Organization. The United States delegation included four representatives of the United States Government, two representatives of the employers of the United States, and two of the workers of the United States.

Union Plaster Co. Opens Gypsum Plant in Arizona

Carleton M. Rogers, president of the Union Plaster Company of Phoenix, Ariz., reports that the company's new gypsum plant, located on the outskirts of Phoenix, went into initial operation in September of this year.

The company, an affiliate of the Pacific Rock & Gravel Company of Los Angeles, was incorporated in 1937 and immediately afterward began exploratory studies of available gypsum deposits in Arizona. At Winkelman, it discovered a deposit well suited to its needs and acquired 520 acres, containing an estimated 10,000,000 tons of raw gypsum. Further developments were held up because of the war, but construction was pushed at the end of hostilities.

The gypsum rock is transported from the Winkelman quarry to the Phoenix plant by rail.

Mr. Rogers served in World War II with the Army Engineers in both the Pacific and European theatres. W. W. Alexander is chief engineer and R. V. Leeson, consulting engineer.

The Gypsum Association at Chicago has announced the removal of its offices to 330 South Wells Street, Chicago 6, on December 1, 1946.

Coming Events

January 14-17, 1947—Cleveland. First national Materials Handling Exposition, Public Auditorium.

January 27-29, 1947 — Chicago. 30th annual convention, National Crushed Stone Association, Edgewater Beach Hotel. (No exhibits.)

January 27-30, 1947 — Chicago. 28th annual convention, Associated General Contractors of America, Inc., Stevens Hotel.

January 30-31, 1947 — Chicago. Second annual convention, Agricultural Limestone Division, National Crushed Stone Association, Edgewater Beach Hotel. (No exhibits.)

February 16-20, 1947 — New York. Annual meeting, American Institute of Mining and Metallurgical Engineers, Hotel Pennsylvania.

March 3-5, 1947—Los Angeles. 31st annual convention, National Sand & Gravel Association, Biltmore Hotel. (No exhibits.)

March 5-7, 1947 — Los Angeles. 17th annual convention, National Ready-Mixed Concrete Association, Biltmore Hotel.

March 17-22, 1947—New York. 75th anniversary celebration, American Institute of Mining and Metallurgical Engineers, with World Conference on Mineral Resources, Waldorf-Astoria Hotel.

Permanente Cement Co. Announces Plans for 10 Percent Expansion

Henry J. Kaiser recently took another step toward relieving the acute building materials shortage by announcing that the Kaiser-managed Permanente Cement Company, operators of the world's largest cement plant, would increase its capacity by 10 percent to provide Pacific Coast builders and contractors with another 2,000,000 sacks of cement annually.

Mr. Kaiser said that the expansion program had already started, and that work is being rushed to completion to boost Permanente's output from 5,000,000 barrels (20,000,000 sacks) to 5,500,000 barrels (22,000,000 sacks) of cement per year.

The Permanente plant, built in less than seven months in 1939 to supply 6,800,000 barrels of cement for the mighty Shasta Dam, is located near San Jose, Calif., and has bulk loading and shipping facilities at Port Redwood City on San Francisco Bay.

Permanente also has receiving, storage, and packing facilities at Honolulu and Seattle, Wash., and Mr. Kaiser said the additional plant capacity would help serve these areas. The Seattle division started operations in October.

Additions to the present San Jose mill, which is one of the most modern in the industry, call for an expenditure of approximately $1,000,000 and include installation of Fuller coolers on Permanente's four 465-foot kilns, an additional raw mill, a third slurry storage tank, and added clinker crusher equipment.

Boyd Urges N.C.S.A. Members To Make Chicago Reservations

J. R. Boyd, administrative director of the National Crushed Stone Association, and secretary of the association's Agricultural Limestone Division, has issued the annual reminder to member companies of the organizations desiring to send representatives to the January meeting in Chicago. He urges those planning to attend to write at once to the Edgewater Beach Hotel for reservations. The dates: N. C. S. A., January 27-29, 1947; Agricultural Limestone Division, January 30 and 31, 1947.

National Gypsum Plans $1,000,000 New York Plant In Big Expansion Program

Contracts for construction of a new National Gypsum Company gypsum board plant at Clarence Center, N. Y., to cost more than $1,000,000, have been let as part of the company's rehabilitation and expansion program.

"The addition will make Clarence Center one of the most modern of National's gypsum plants," said President Melvin H. Baker. The company got its start 21 years ago at the Clarence Center location.

Plans for the new plant call for installation of additional calcining equipment to provide stucco for the gypsum board and for complete mechanization of the mine to increase production of raw material.

Mining operations will be modernized with new equipment which will materially increase production. Additional calcining kettles will be installed to process the increased rock output. The present board plant will be used for storage of wallboard products.

Permission to build has been granted by the Civilian Production Administration, and work will get under way at once.

Wage and Salary Controls Off By Order of President Truman

Executive Order 9801, removing wage and salary controls adopted pursuant to the stabilization act of 1942, dated November 9, 1946, reads as follows:

By virtue of the authority vested in me by the Constitution and statutes of the United States, and particularly by the Stabilization Act of 1942, as amended, and for the purpose of further affecting an orderly transition from war to a peacetime economy, it is hereby ordered as follows:

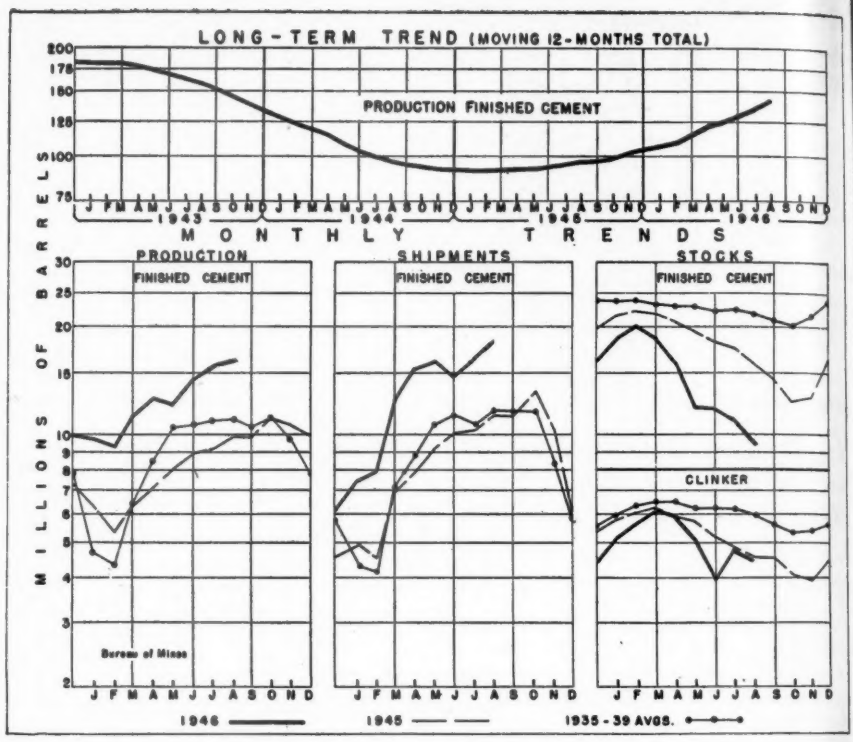
All controls heretofore in effect stabilizing wages and salaries pursuant to the provisions of the Stabilization Act of 1942, as amended, including any Executive Order or regulation issued thereunder, are hereby terminated; except that as to offenses committed, or rights or liabilities incurred, prior to the date hereof, the provisions to such Executive Orders and regulations shall be treated as still remaining in force for the purpose of sustaining any proper suit, action or prosecution with respect to any such right, liability or offense.

Harry S. Truman

Lawrence Portland Cement Company Installs Big Kilns

Twin cement kilns measuring 314 feet in length, believed to be the longest in the world, are nearing completion at the Northampton, Pa., plant of the Lawrence Portland Cement Company. Construction was started last May, and it is planned to have the kilns in operation before January 1.

The new equipment will have the same capacity as four old kilns which they replace, according to M. S. Ackerman, Jr., superintendent of the plant. Dust collecting chambers are now being installed.



Production of 16,213,000 barrels finished portland cement during August, 1946, reported to the U. S. Bureau of Mines, was 63 percent greater than that reported for August, 1945. Although 79 percent of capacity was utilized, production did not meet demands, and mill stocks continued to decline to an August 31 total of 9,322,000 barrels. This represents a decrease of 42 percent from that reported in the corresponding month of 1945. Mill shipments of 17,955,000 barrels were 57 percent greater than those reported for August, 1945. Clinker production of 16,104,000 barrels in August, 1946, represents an increase of 65 percent over that reported for August, 1945.

Demand for cement, as indicated by mill shipments, in August, 1946, as in the previous months, was higher than the corresponding months of 1945, in all districts of the United States and in Puerto Rico, but was lower in Hawaii. The increases range from 13 percent in California to 112 percent in Kansas.

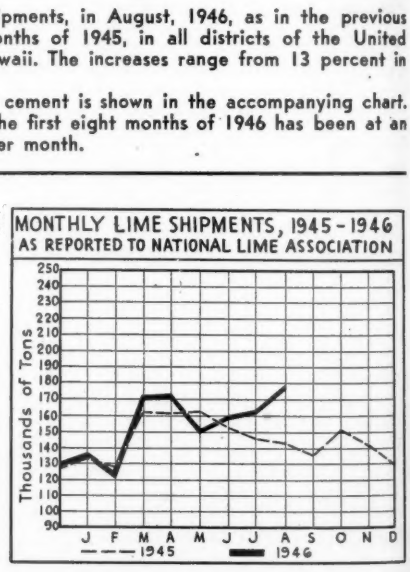
The long-term trend in production of finished cement is shown in the accompanying chart. The upswing in the moving 12-month total for the first eight months of 1946 has been at an average of slightly less than 5 million barrels per month.

New Plant Being Built by Limestone Products Co.

J. Lambert Lain, president of Limestone Products Company of Cleburne, Tex., has announced that construction of the firm's new plant there has begun.

Limestone will be quarried from a deposit about 15 miles from Cleburne and trucked to the plant by heavy-duty hauling units. The initial calcining equipment will consist of two Cliffe Lime Producers of 10-ton capacity each. This battery will later be enlarged to include 10 of these units. Lime Industry, Management & Engineering of Hershey, Pa., the consulting engineers, have had the project under design for more than two years.

Reservations for the thirty-first annual convention of the National Sand and Gravel Association, to be held at the Biltmore Hotel, Los Angeles, from March 3 to 7, 1947, should be made now, announces Executive Secretary V. P. Ahearn.



According to data collected by the National Lime Association, 46 companies in August, 1946, shipped 177,528 tons of lime (103,244 quicklime; 74,285 hydrate). Reporting companies represent 42.6 percent of the association members' total capacity of record. Based on Pit and Quarry's estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 459,000 tons. Shipments of lime by users for August, 1946, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	2,463	14,273
Building	12,603	34,412
Chemical	88,178	25,599
Total	103,244	74,284

Grace M. Evans Establishes Foundation for Aged on 400-Acre Indiana Estate

Mrs. Grace M. Evans, proprietor of the Monon Crushed Stone Company of Monon, Ind., has completed arrangements for turning over to charity the greater part of her holdings. The La-

Mrs. Grace M. Evans

fayette Diocesan Charities, Inc., a Catholic benevolent organization, was the recipient of the gift, which by the wish of the donor will be utilized for the relief of the aged. The corporation will erect and maintain the Grace M. Evans Foundation for the Aged on a tract of land in White County, near Brookston, Ind.

The 487-acre site of the proposed home is the initial gift of Mrs. Evans. In addition to the income from this fertile land the proceeds from the operation of the Monon Crushed Stone Company will also be used to maintain the institution until a contract of sale is completed. A 400-acre farm, now subject to a contract of sale, will add another considerable sum to the gift fund.

Plans for the home have been prepared, and construction will begin as soon as materials are available. A community of Catholic sisters will be in charge of the institution.

Mrs. Evans is the widow of the late Herman H. Evans, who began to produce agricultural and construction limestone at the quarry near Monon in 1910. During World War I the quarry was closed. In 1919, a year after the death of Mr. Evans, Mrs. Evans reopened the quarry, which she has been operating successfully since that time. She hopes soon to realize her wish to travel extensively in foreign countries.

National Slag Association Elects New Officers

During a two-day session of the board of directors of the National Slag Association at its twenty-ninth annual convention, held at the Wardman Park Hotel in Washington, D. C., on November 29 and 21, the following officers were elected: president, W. E. Bliss; vice-president, E. L. Flad; secretary, E. W. Bauman; treasurer, W. S. Shaw; managing director, H. J. Love.

Post-War Operation Resumed At North Amer. Cement Plant

For the first time since 1942, the North American Cement Corporation's plant at Howes Cave, New York, will resume operation as soon as needed repairs are completed. For six years prior to the closing of the plant in the early months of World War II, there had not been one accident which prevented a worker from going back to work on his next shift.

Pit and Quarry presents herewith the portraits of three officers of the newly-formed Gager Lime Company (formerly the Gager Lime Manufacturing Company) of Sherwood, Tenn., which did not reach us in time to be published in connection with the news story appearing on page 70 of the November issue. Left to right: F. M. Ferguson, general manager; W. J. Mills, president; J. M. Gager, Jr., sales manager.

Buffington Named Chairman Of Cement-Quarry Safety Section for 1946-1947

Officers chosen for 1946-1947 by the Cement & Quarry Section of the National Safety Council include the following: General chairman, J. F. Buffington, New York Trap Rock Corporation, New York, N. Y.; vice-chairman, J. R. Boyd, National Crushed Stone Association, Inc., Washington, D. C.; secretary, Mrs. Roma M. Turpen, National Lime Association, Washington, D. C.; news letter editor, L. D. Cowling, Louisville Cement Corporation, Inc., Speed, Ind.; engineering committee chairman, Frederick B. Hunt, Dewey Portland Cement Company, Davenport, Ia.; membership committee chairman, Lea P. Warner, Jr., Warner Company, Philadelphia; program committee chairman, Walter J. Scahill, Missouri Portland Cement Company, St. Louis; statistics committee chairman, Forrest T. Moyer, U. S. Bureau of Mines, Washington, D. C.; visual aid committee chairman, F. L. Maus, Alpha Portland Cement Company, Easton, Pa.

Members at large include the following: V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.; H. M. Beatty, The Kelley Island Lime & Transport Company, Cleveland, O.; A. J. R. Curtis, Portland Cement Association, Chicago; R. A. Dittmar, Universal Atlas Cement Company, Chrysler Building, New York, N. Y.; O. M. Graves, The General Crushed Stone Company, Easton, Pa.; Johan Norvig, Pennsylvania-Dixie Cement Corporation, Nazareth, Pa.; M. C. M. Pollard, National Gypsum Company, Buffalo, N. Y.; W. M. Powell, Medusa Portland Cement Company, Cleveland, O.; General H. A. Reninger, Lehigh Portland Cement Company, Allentown, Pa.; Wallace E. Wing, Marblehead Lime Company, Chicago; A. L. Worthern, The New Haven Trap Rock Company, New Haven, Conn.

G. G. Grieve of the National Safety Council, Inc., Chicago, was appointed staff representative for the council.

Residential Construction Contracts Up 3 Percent In Midwest, Eastern U. S.

Investment commitments for residential construction in September increased 3 percent over the dollar volume of contracts awarded in August in 37 states east of the Rocky Mountains, it was reported today by F. W. Dodge Corporation.

September residential contracts totaled $293,831,000, as against $284,025,000 in August and called for the construction of 40,390 dwelling units. Publicly-owned dwellings accounted for 9 percent of the September dollar volume of awards, and amounted to $26,702,000.

Gains in residential contract awards were not uniform in all areas. Declines described as moderate to severe were reported by the Dodge organization for metropolitan New York, northern New Jersey, upstate New York, the Southeastern states, western Pennsylvania, West Virginia, Ohio, the South Central states and Texas. New England showed the greatest gains.

Nonresidential construction contracts declined from $211,530,000 in August, 1946, to $169,627,000 last month, while heavy engineering works fell from $184,354,000 to $156,399,000 in the Eastern states, the Dodge Corporation reported.

The demands of government agencies on the available critical materials and equipment is revealed in a tabulation showing that 23 percent of the dollar value of all contracts awarded during the first nine months of this year was for projects listed as "publicly-owned," the Dodge Corporation reported. September awards listed as publicly-owned amounted to 30 percent of the total of all awards.

The total of all construction contracts awarded in the 37 states during the first three-quarters of this year was $5,995,493,000, as against $2,281,960,000 in the corresponding period of 1945 in the states east of the Rockies. Residential construction in the first nine months of this year aggregates $2,492,556,000; non-residential construction contracts totals $2,182,054,000; and public works and utilities construction contracts amounts to $1,280,883,000.

Slight Decline Noted In Annual 1945 Lime Output

The lime industry in 1945 experienced a moderate decline, as compared with 1944, according to figures submitted by producers to the Bureau of Mines, United States Department of the Interior. Sales of "open-market" lime totaled 5,920,579 short tons—a decline of 9 percent from 1944 and 10 percent from the all-time high of 1943. The average price per ton increased 24 cents. Quicklime represented 77 percent and hydrated lime 23 percent of the total, whereas, in 1944 the percentages were 80 and 20, respectively. Sales of agricultural limestone declined 20 percent. The upward trend in the construction industries was reflected in a 6 per cent. gain in sales of building lime. The decline in production of war materials without a corresponding gain in peacetime manufacturing industries led to a 9 percent drop in sales of chemical and industrial lime and an 8 percent drop in sales of deadburned dolomite.

The supply situation with respect to chemical and industrial lime continued to be critical throughout 1945.

International Minerals To Build New Fertilizer Plant

International Minerals & Chemical Corporation has completed negotiations for the purchase of 10 acres of industrial property in Pensacola, Fla., upon which it expects to begin construction of a fertilizer plant.

For the past 12 years the company has been using leased facilities from the Louisville & Nashville Railroad Company, in which it has been conducting its manufacturing operations. The new plant is being constructed to provide for more efficient operations and greater output with which to take care of expanded business in that region.

The new building, which will be 180 feet wide and 210 feet long, is expected to be completed by June, 1947. It will be capable of producing 20,000 tons of mixed fertilizer annually.

Booklet Urges Reinstatement Of Lapsed G. I. Insurance

A folder entitled "G.I. Insurance Streamlined," published by the Illinois Commercial Men's Association, informs veterans of World War II that the deadline set by the Insurance Act of 1946 for reinstatement of lapsed G.I. term insurance is February 1, 1947, six months after passage of the act. Those desiring a copy of the folder may apply to R. A. Cavenaugh, Illinois Commercial Men's Association, 332 S. Michigan Avenue, Chicago 90.

The major reasons for dropping G.I. insurance are considered and important changes affecting them by the action of Congress are discussed in non-technical language.

Corson Elected Head Of Operating Division at N.L.A. Directors' Meeting

The board of directors of the National Lime Association held its annual fall meeting at The Homestead, Hot Springs, Va., on November 15, 16 and 17, 1946, less than two weeks after the successful operating meeting at Hershey, Pa. The operating division was one of the chief subjects discussed, and this new but permanent division of the association will hold its next closed meeting immediately following the annual convention at Hot Springs in May, 1947. The agricultural and finishing lime divisions were also discussed, as were the research programs being carried on at Rutgers University, the Massachusetts Institute of Technology, the U. S. Bureau of Standards and five state agricultural experiment stations. Arrangements for further work were outlined. Also discussed was a proposed 125-page book on all the chemical uses for lime.

For his services in connection with OPA negotiations, H. D. Brigstocke, Thomasville Stone & Lime Co., York, Pa., was presented with a beautiful sterling silver platter on which were etched the signatures of the association directors and the members of the OPA industry advisory committee who worked with him.

Bolton L. Corson, G. & W. H. Corson, Inc., Plymouth Meeting, Pa., was elected chairman of the operating division to succeed Russell Rarey, Marble Cliff Quarries Corp., Columbus, O., who was commended for having done an excellent job with the meeting at Hershey.

S. Walter Stauffer, long president of the National Lime Association, announced his resignation from this office in December, 1946, to devote his full time to private business affairs. His resignation was accepted with regret.

Output of China's Salt Mines Helps to Restore Railroads

Salt production in northern China is progressing smoothly, according to the *Shipping Register and Pacific World.* At Changlu in East Hopei the North China Salt Industrial Company has installed electrically-operated equipment with which it produces refined table salt at a cost only 20 percent higher than crude salt. The first supply of table salt produced by the company was sent to Nanking. This firm also makes a fine quality of magnesium chloride.

Salt mines and factories in Tsingtao, Tangku and Taiwan will furnish a shipment of 500 tons of table salt to be sent to Japan by the end of this year under a special arrangement with General Douglas MacArthur. A total of 500,000 tons has already been shipped. The salt will be used in barter for railway materials. A large number of sleepers and several thousand tons of rails have arrived from Japan to repair the Tsingtao-Tsinan Railway in Shantung province.

New Strike Settlement Reopens Allis-Chalmers Plant at La Crosse, Wis.

A new settlement in the labor walkout at the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., reduced to two the number of the firm's plants still out on strike.

The latest agreement was reached at the concern's La Crosse, Wis., plant between CIO Industrial Union 1424 and the company, where a vote of 347 to 77 favored the new contract.

With provisions similar to those in other Allis-Chalmers contracts signed recently, the La Crosse agreement specified a 13½ cent-an-hour wage increase. This added to a 5-cent increase granted by the company last December, brings the total wage hike to the national pattern of 18½ cents. Workers at the La Crosse works began their walkout April 30, 1946.

The Allis-Chalmers main works at West Allis and the Boston, Mass., plant are the only ones remaining on strike. Production workers returned to their jobs at the company's Pittsburgh, Pa., Springfield, Ill., and Norwood, O., plants in September. Approximately 2,500 production employees have returned at West Allis, although negotiations for a new contract are still underway there between the company and officials of the CIO Local 248 of the United Automobile Workers' Union.

University Students to Learn Safe Truck Driving Practice

A five-year research project to promote safe, economic and efficient highway transportation has entered its initial phase during the current school year at the University of Wisconsin College of Engineering. The project, supported by a $50,000 grant accepted in 1945 from The Four Wheel Drive Auto Company, is under the direction of Archie H. Easton.

The primary objectives of the research project are to make basic studies of truck and highway design considering safety, economy and efficiency; to compare four-wheel drive trucks with single-axle drive trucks through experimental tests; to provide advanced study in the fundamentals and techniques of truck and highway design for safe, economic and efficient transportation.

Continuous investigations have been conducted for several years by Herman V. Larsen, Four Wheel Drive experimental engineer. Several of Mr. Larsen's experiments, particularly the turning circle tests, will be examined by the university researchers.

Huschke Confirms Status Of Agricultural Limestone

In a communication addressed to member companies of the Agricultural Limestone Division of the National Crushed Stone Association, Henry A. Huschke, managing director, makes the following statement:

"Although the statement of President Truman has been given wide publicity, we find there is uncertainty in the minds of some businessmen as to the present status of price control. This, then, is to inform you that effective 12:01 a. m., November 10, 1946, price controls were officially removed from *all services and commodities except rent, sugar, syrups and rice. . . .*"

A statement made by the Public Roads Administration reveals that the federal-aid highway program will not be appreciably affected by the Steelman order placing a moratorium on federal construction. Any project listed with the P.R.A. is considered as a commitment and will be carried out.

• Herman Larson (left), experimental engineer at The Four Wheel Drive Auto Company, with Archie H. Easton (right), engineer in charge of the five-year research project being conducted by the University of Wisconsin to promote safe, economic and efficient highway transportation.

High-Grade Silica Sand To Be Mined from Edge Of Famous Meteor Crater

W. A. Moeur, president of the newly-organized Meteor Silica, Inc., recently revealed that the company will work a huge deposit of high-grade silica sand on the rim of the meteor crater near Winslow, N. M. The first shipment of 2,500 tons of sand has already been made. Tests made by the University of Arizona bureau of mines indicated that the deposit is "one of the very best . . . to be found in the United States."

Other officers of Meteor Silica, Inc., are Arthur H. Vaughn of Phoenix, Ariz., secretary-treasurer; Earl Pomeroy of Tempe, Ariz., operations manager, and C. W. Davis of Phoenix, director.

Chilean Nitrate Concern Orders Big Diesel Engine

The Chilean Nitrate Sales Corporation has ordered for the Lautaro Nitrate, Ltd., Tocopilla, Chile, a 10-cylinder Nordberg diesel engine. After routine testing at the plant, the engine will be dismantled and shipped.

The Lautaro Nitrate, Ltd., has three power plants, connected by transmission lines. They are located at Tocopilla, Pedro de Valdivia and Maria Elena. The new Nordberg can thus be used to transmit power from Tocopilla to the two other plants in the event of an emergency. Five M.A.N. double-acting, two-cycle engines are now in use at Tocopilla.

Specifications of the big new diesel are as follows: cylinder bore, 29 inches; stroke, 40 inches; normal speed, 164 r.p.m., with rating of 7,100 brake horsepower. The two-cycle unit is single-acting, fitted with crossheads, and employs mechanical fuel injection. A separate motor-driven centrifugal blower supplies scavenging air. Since the plant at Tocopilla is 4,920 feet above sea level, the horsepower rating of the engine is reduced to 6,400.

Historic Arizona Onyx Deposit to Be Worked

At Mayer, Ariz., large-scale development and operation of the Mayer onyx deposit are under way. Title has been cleared to the claims after years of litigation, and a new company, Yavapai Onyx, Inc., has launched the new industry. Joseph Kelley is president, and Gyril Shettler is vice-president of the firm. A cutting and polishing plant has been set up at Omaha. Two carloads of material were shipped out in two weeks of work at the deposit.

The Pit and Quarry Directory will show you that a large and steadily-growing percentage of ready-mixed concrete plants are operated by aggregates producers.

All-Magnesium Truck Train Hauls Increased Payloads

Construction of an all-magnesium truck train, designed to haul a payload of 6,000 pounds more than conventional steel units of the same type, was revealed recently by Henry J. Kaiser. The lightweight unit was developed by The Permanente Metals Corporation of Oakland, Calif., for the Permanente Cement Company, also of Oakland.

This bulk cement carrier is a 60-foot unit consisting of a semi-trailer and trailer pulled by a Peterbilt tractor, powered by a 150-hp. Cummins diesel engine. The weight of the entire train with a full load of fuel oil is 25,570 pounds. A maximum gross load of 76,800 pounds is allowed by the state of California vehicle code, giving the new carrier a possible payload of 51,230 pounds as compared to a payload of 45,310 pounds for the lightest of smilar steel units.

The Permanente Metals Corporation utilized aircraft principles of monocoque construction in building the light bulk carrier, which is less than 6½ feet wide and only 10 feet high. Light-weight, high-strength magnesium alloy was used by the entire body, as well as for ladders, hatch covers and dumping mechanisms. Doors, handles, hubs and spokes of gears all are made of magnesium sheet and castings.

Sheet used in the carrier walls range from ¼ to ⅛ inch in thickness and are protected with clear lacquer to preserve the natural finish. The side plates of the body act as load carrying members, thus eliminating the conventional frame. "Feather-Ride" coil spring suspension supports the rear end of the semi-trailer and the full trailer. The full trailer dolly uses a single Feather-Ride oil cushioned spring. The semi-trailer weighs 4,840 pounds; the trailer complete with dolly and drawbar, 7,050 pounds and the tractor, including fuel oil and a fifth wheel, 13,680 pounds.

Permanente Cement Company officials says the new carrier will haul an additional payload of approximately 16 barrels of cement (6,016 pounds) at decreased operating costs without placing an extra burden on state highways. It is estimated that a fleet of six of these magnesium units, working on a monthly 8,000 mile run, one half of which would be payload, would haul 864,000 more payload tons per mile in one year than steel units of similar size and number.

Other savings realized by use of the lighter magnesium truck train include longer tire life, savings on fuel consumption due to a lighter load return, longer body life and faster hauls made possible by better roadability, the result of a lower center of gravity in the unit.

Rock Dusting of Mines Urged as Safety Measure

They Don't Have to Die, an article by Elsie McCormick appearing in the August 10, 1946, issue of the *Saturday Evening Post,* discusses the safety measures recommended for workers in coal mines by the U. S. Bureau of Mines.

Among these measures is the use of powdered limestone throughout the mine to prevent coal dust explosions. If liberally used, rock dust renders coal particles inert and incapable, in the event of an explosion, of carrying a blast beyond a small area. Figures were quoted to show that mines which were adequately rock dusted averaged 14 fewer fatalities per explosion than those inadequately treated. The fatality ratio between adequately dusted mines and untreated mines was stated to be 1 to 7.

Despite these startling figures, the urging of the Bureau of Mines and the insistence of John L. Lewis that rock dusting be universally adopted by operators, only 100 of the nation's 4,000 coal mines are properly treated. The reasons given for the delay in using this safety measure are the operators' reluctance to pay for its application and their fear that dust-covered coal might not be acceptable to dealers, as well as the miners' mistaken belief that rock dusting is a possible cause of silicosis.

Shotwell's $172,600 Bid on Columbia Project Accepted

Concrete aggregates for use in construction work on the Bureau of Reclamation's Columbia Basin Project in the state of Washington will be processed under a contract which recently was awarded the low bidder, J. G. Shotwell of Albuquerque, N. M.

The contract, in the sum of $172,600, will be undertaken by Mr. Shotwell at a deposit near Coulee City, Wash., and will involve 42,000 cu. yds. of excavation and stripping, preparation of 40,000 cu. yds. of sand, and 70,000 cu. yds. of coarse aggregates in three sizes. All material will be washed and screened, and some of the oversize will be crushed.

Nat. Gypsum Co. Resumes Full Production of Lath And Sheathing Cut by OPA

With the end of OPA control over most commodity prices, the National Gypsum Company of Buffalo has announced that it will resume shortly the production of gypsum sheathing and will step up production of gypsum lath in all its plants.

Because of unfavorable price ceilings the company had halted the output of sheathing and had cut gypsum-lath production to about 25 percent of normal. "The end of controls means we can make proper adjustments to induce a speedup of production," said Melvin H. Baker, National president. "Price increases will be modest and conservative. We won't price ourselves out of the market."

U. S. Gypsum Company to Build Plants in Utah and Virginia

The United States Gypsum Company has announced that construction is soon to begin on a large gypsum plant in Sigurd, Utah, 130 miles south of Salt Lake City. The installation of new facilities at Sigurd marks the company's first step in a program of expansion, said William L. Keady, president. The plant will be located on the 920-acre tract of gypsum-rich land purchased by U. S. Gypsum in 1936.

Some weeks ago the application of U. S. Gypsum for construction of a $670,000 plant at Berkley, Va., was recommended for immediate approval by the Hampton Roads Advisory Council of the Civilian Production Administration. Plans for the new facilities also include the expenditure of $1,000,000 for processing equipment.

Spar Mills Opened by Inland Steel and Amer. Zinc & Lead

The Inland Steel Company fluorspar gravity mill located at Rosiclare, Illinois, resumed operations recently, after being shut down for nine months.

The American Zinc and Lead Smelting Company of St. Louis has recently acquired leases on three Kentucky fluorspar properties. Among these is the property known as the "Nine Acre Tract," which originally was explored by a mining company headed by President Andrew Jackson.

According to Circular 13, *Agstone Used in Illinois in* 1945, published by the Department of Registration and Education, Division of the State Geological Survey, at Urbana, Illinois, more than 4,220,000 tons of agricultural limestone (ground limestone, dolomite and marl) was used for soil improvement throughout the state in 1945. This was approximately 10,000 tons more than the amount used in 1944 and established a new all-time high record.

Building Industry's Problems Seen as Major Feature Of Materials Handling Show

The building industry's problems of materials handling will receive special attention at the first national Materials Handling Exposition, to be held at the Public Auditorium of Cleveland, January 14-17.

Building executives will have the first opportunity to compare competing systems and machinery for materials handling. All phases of such equipment will be discussed, with special consideration to problems of builders. Handling on the job, as well as handling for receiving, shipping, loading and warehousing, will be discussed and appropriate machinery exhibited on the exposition floor.

On exhibition will be hoists, hoist mountings, many types of conveyors, hand and power trucks, skids and pallets, tractors and trailers, and other devices to reduce costs and increase safety factors.

Earl I. Burke, manager of shipping for the Republic Steel Company, heads the exposition's policy committee. Others on the committee are T. O. English, assistant chief purchasing agent, the Aluminum Company of America, and Col. Albert B. Drake, materials handling engineer for Drake, Stevenson, Sheahan, Barclay, Inc., of New York.

Admission to the sessions may be obtained from the exposition management.

Mechanized Earth-Eaters Attack 12,000,000-Yard Job

Attapulgus Clay Company, Amsterdam, Ga., with 12,000,000 yards of Georgia red clay to be stripped at its fuller's earth mine, is using four Tournapulls to move 5,000,000 cubic yards in the top 30- to 35-ft. lift. A Bucyrus-Monighan 6160 dragline is used for overcasting to complete the stripping operation, digging out an additional 35 to 40 feet.

The grade out of the cut in 10 percent for the first 200 feet, with an additional 300 feet of 10 percent grade further on. The remainder of the 2700-ft. haul is fairly level. Mine records covering 2½ years show a day-in-day-out average of 42 loads per unit every 8 hours of operation. Engineers estimate loads at 10 pay yards in the red clay and sand. This production record has been proved conservative by mine engineers' actual cross sections, which usually show an extra 2,000 to 4,000 cubic yards moved over a three-month period. The rigs dump in a nearby valley where the wasted overburden now is 25 to 30 feet deep.

Since Tournapulls started on this stripping project in 1944, benching costs have been cut in half, records show. Three of the rigs have their original tires on them.

Well-maintained haul roads, sprinkled in dry weather, good operators and a preventive maintenance program all contribute to operating efficiency. Tournapull operators use their scrapers to keep the road maintained on their return to the cut. A motor grader also is used to hold a crown on the haul road and assure sufficient drainage.

Swedish Cement Concern Hits All-Time High in 1945

Word from the Skanska Cement A.B., a Swedish firm which controls nearly all of Sweden's portland cement output, a total of 743,000 tons of cement was produced at the company's works during 1945. Cement consumption was 19 percent higher than in 1944, exceeding the record for 1939 by 7 percent. The prevailing coal shortage hampered production, however.

During the closing months of 1945 the firm was allotted some American coal; and peat and inferior coal were obtained from the company's own properties in southern Sweden. Fuel oil may be used to supplement the inadequate coal stocks.

An expansion program currently in progress at the Skanska plant at Koping in central Sweden will increase the capacity of the works by 160,000 tons. The concern also plans to build a new cement plant near Stockholm, to be completed about the end of 1947, which will have a capacity of about 320,000 tons per year.

Dust collection is rapidly becoming one of the most important problems in the nonmetallic minerals industries. See the Pit and Quarry Handbook for complete information.

Stockpiling System Solves Problem of Winter Supply For Montana Producer

At Blum, Mont., the Grant Smith Company produces ballast for the Northern Pacific railroad. Since the material must be washed, production in winter is impracticable. Accordingly, large stockpiles are built up for winter ballasting. (See illustration below.)

Pioneer engineers worked out a complete system with pre-engineered Pioneer conveyors, by which the material is moved into stock piles and later loaded into the cars from the piles. The conveyor system consists of three 150-ft. Pioneer stationary belt conveyors and one 50-ft. Pioneer portable conveyor. Material can be discharged at the end of any one of the three long conveyors or by trippers from the second and third.

The portable conveyor spreads the stockpile to 50 feet on either side of the stationary conveyors. When loading out of the stockpile, the portable conveyor feeds the material into the cars.

New Gypsum Firm in Utah Building Plant at Sigurd

The Western Gypsum Company, a newly-organized firm headed by S. H. Eliason of Salt Lake City, will build a plant at Sigurd, Utah, in the immediate future, according to an announcement made by the firm. The Western Gypsum Company has taken over the facilities of the American Keenes Cement & Plaster Company at Sigurd. The new plant is expected to be completed early next year.

• Three 150-ft. belt conveyors handle surge in Grant Smith Company's ballast production.

• Scrapers assist in the removal of 5,000,000 cu. yds. of clay overburden at Amsterdam, Ga.

New Zealand Cement Firm's Representatives Inspect U. S. Facilities and Shipping

Recent visitors in Chicago were Douglas O. Whyte, manager, and R. S. Harle, superintendent, of the Golden Bay Cement Co., Ltd., Wellington, New Zealand. They recently left after a six-week visit, during which they investigated the shipment of bulk cement and coal by water. At present most of the cement used in New Zealand is shipped in sacks by water as most coastal points cannot be reached by rail or highways. They also visited many cement plants to study methods and equipment, as it is planned either to expand the present 420,000-bbl. plant or to build a new one.

Supply of Crude Gypsum Shows Increase for 1946

The apparent new supply of crude gypsum in the United States in the first quarter of 1946 was 39 percent greater than during the corresponding quarter of 1945, according to the U. S. Bureau of Mines. Similarly, the output of calcined gypsum was 54 percent higher. As crude and calcined gypsum production is the generally accepted barometer of reconversion in the industry, it is evident that progress is being made.

Despite labor and materials shortages and price difficulties, increases were noted in almost every phase of the gypsum products industry.

The output of crude and calcined gypsum was higher in the second quarter of 1946 than in the first, continuing the normal seasonal trend. Production of both items was the highest since the third quarter of 1941.

Receipts from Nova Scotia were much greater than during the corresponding period of 1945, and compared favorably with second quarter imports in pre-war times. An increase in the freight rate from Nova Scotia to Atlantic ports has been pending before the War Shipping Administration for some time.

Gulf Portland Cement Co. Begins $1,000,000 Expansion

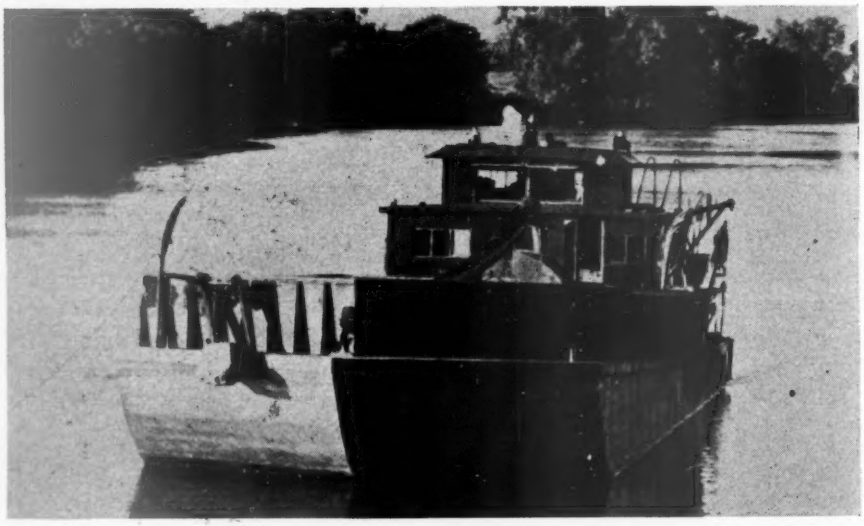
Plans for a $1,000,000 expansion program which will increase the production of the Gulf Portland Cement Company from 3,500 to 5,000 barrels per day were announced recently at Houston, Tex., by company officials.

An announcement made by the firm's parent company, the Ideal Cement Company, stated that a portion of the equipment acquired by it through the purchase of the $18,000,000 sinter plant at Mobile, Ala., last May (see PIT AND QUARRY, July, 1946, page 89) will be moved to Houston. Included in these facilities are a 250-foot kiln. Gulf Portland's expansion plans are geared to accommodate the needs of the Houston area's vast construction program.

Iraqi Cement Concerns Plan Expansion Programs

According to Victor von Lossberg, Commercial Attaché at Baghdad, the Iraq Building Material Company, Ltd., is planning to build a cement plant with a daily capacity of 300 metric tons and an annual total production of 90,000 tons. The management reportedly has expressed a preference for American-made equipment.

A second firm, the Iraq Cement Company of Baghdad, was forced to delay work on its new plant because of floods. The new facilities were designed for a daily output of 250 metric tons, or about 75,000 tons a year.



• This steel-hulled sand barge travels up and down the Thames River in Ontario, Canada, picking up sand for building and construction work and carrying it to Chatham, where it is unloaded. The barge, which measures 78 by 21 feet, is propelled by a 6-cylinder Series 71 General Motors marine diesel engine. Power for the 6-inch Morris Machine Works sand pump is furnished by the same engine through a power take-off directly connected to the front end of the crankshaft. When the barge reaches a good location, the propeller is declutched, the "sand hog" is lowered, and the work of loading the barge with sand begins. A. P. Park has operated the barge since the recent death of his father, for whom the barge was constructed. He states that the barge has proved to be very economical in that the fuel cost of a day's operation is only about fifty cents.

A.S.T.M. Cement Standards For 1946 Now Available In Indexed Book Form

The 1946 edition of the compilation of *A.S.T.M. Standard on Cement* presents in convenient form the six standard specifications for portland and other types of cement, gives fifteen standardized methods of testing and also contains considerable supplementary material including information on analytical balances and weights, a manual of cement testing, a list of selected references on portland cement, and the personnel of Committee C-1 on cement and its subcommittees. The specification for sieves for testing purposes is also given.

The cement specifications cover the five types of portland, blast-furnace slag, natural, masonry, and air-entraining for for concrete pavements. The methods included cover chemical analysis, compressive strength, fineness, autoclave expansion, sampling, air content, heat of hydration, normal consistency, specific gravity, soundness, tensile strength, and time of setting.

This 190 page book in heavy paper cover, with a detailed index may be procured from A.S.T.M. Headquarters, 1916 Race Street, Philadelphia 3, Pa., at $2.00 per copy.

Car Loadings of Cement and Aggregates Expected to Rise

Freight car loadings of cement in the fourth quarter of the current year are expected to be 42.6 percent above those for the same period in 1945, according to estimates compiled by the 13 Shippers' Advisory Boards and made public by the Association of American Railroads. On the basis of these estimates, freight car loadings of cement will total 168,090 in the fourth quarter of 1946, as compared with 117,914 car loadings in the corresponding period last year.

In the same period, freight car loadings of gravel, sand and stone are expected to increase 15.8 percent, from 365,230 to 422,840. Brick and clay products are expected to increase 12.7 percent, from 55,136 to 62,141, while car loadings of lime and plaster are expected to jump 14.6 percent, from 33,567 to 38,476.

CPA Grants 1,637 Permits For Non-Housing in One Week

A total of 1,637 applications for non-housing construction, with a dollar value of $27,450,710, were approved by the Civilian Production Administration throughout the nation during the week ending October 31.

During the week the 71 CPA district offices, along with the Facilities Review Committee in Washington, denied 1,127 applications for commercial, institutional and industrial construction, with a dollar value of $26,095,851.

Between March 26, when the construction limitation order went into effect, and October 31, CPA approved 59,287 applications worth $2,128,260,306 and denied 42,435 applications valued at $1,597,384,282.

Increased Construction East of Rocky Mountains Predicted by Dodge Corp.

Construction volume in the 37 states east of the Rocky Mountains will increase approximately 25 percent in 1947 over that of this year, it was estimated today by Thomas S. Holden, president of F. W. Dodge Corporation, a fact-finding organization for the construction industry.

The Dodge executive indicated that 630,000 dwelling units would be built in the states east of the Rockies next year, a gain of 35 percent in number and 38 percent in dollar volume over the expected 1946 record. The residential estimates assume, he said, that the present system of priorities and allocations of materials will be out next year.

An anticipated gain of 7 percent in nonresidential construction, such as commercial, industrial and educational building, and 22 percent in public works and utilities during the coming year, added to the increased residential volume, would bring the total of all construction in the 37 states to slightly more than $9,500,000,000, as against $7,700,000,000 expected this year.

"In the present situation, the general economic conditions surrounding construction activity and the types of stresses and strains likely to prevail within the industry are even more important for appraising the outlook for the coming year than are attempted measures of construction demand," Mr. Holden said.

"Construction activity will not necessarily participate in the expected recession of general business. Odds are that it will not, but will continue on an increasing scale without serious setback. If this turns out to be true, construction may be the principal sustaining activity tending to moderate the impact of price recession on the general business structure," the Dodge executive declared.

"The recent removal of material price controls will stimulate increased production of many scarce items," Mr. Holden said. "It will probably result in numerous price increases over present ceilings, but to levels lower than black market prices. Materials in approximately balanced supply will stabilize quickly. The few items that may show marked price increases will not necessarily count heavily in total construction costs.

"Construction costs will rise somewhat above recent OPA theoretical levels indicated by published index numbers, but will be measurably less than actual costs. Elimination of the numerous abnormal costs engendered by controls will give the industry considerable leeway in adjusting itself to free market conditions.

"Most construction materials will progress from sellers' markets into buyers' markets during the course of next year, and material supply will cease to be the major bottleneck. The major bottleneck will be shortage of skilled labor. While apprentice training has been stepped up, and many building trades unions have recruited new members, recruitment has not kept pace with needs in a number of important trades.

"While the prospect of general business recession has prompted talk of federal stimulation of public works, there is serious question as to whether such a course would be necessary or desirable. Odds favor continuation of effective private construction demand on such a scale as to make greatly enlarged public works programs unduly competitive for materials and labor in the 1947 market," Mr. Holden declared.

"Residential building is estimated to increase 38 percent in dollar volume over the final 1946 total. This estimate assumes an approximately uncontrolled market during most of 1947. The large estimated increase in apartments and hotels is predicated on the assumption that new construction will be completely exempted from rent ceilings. Rent ceilings have been and continue to be the principal deterrents to apartment building. It has been conclusively shown that increased supply of rental housing is the most urgent need in the whole housing shortage situation, both as it affects veterans and nonveterans."

Los Angeles Cement Concern Sues RFC for $7,500,000

The Monolith Portland Cement Company of Los Angeles recently filed a $7,500,000 damage suit in superior court, naming the Reconstruction Finance Corporation, which is charged with breach of contract for the erection of a plant in Laramie, Wyo.

According to the firm, an agreement was signed on January 28, 1943, under which the RFC contracted to advance $4,639,048 for the construction of a testing plant for a process in which aluminum ore was to be produced from clay. Monolith subsequently deeded 40 acres of land to RFC, and the construction of a plant was begun. The buildings were nearly completed when the government agency served notice of cancellation of the entire agreement on September 10, 1946. The cement company holds that the RFC had no right to make such a cancellation until at least 90 days after the completion of the plant and production of its first ore.

Production of Aggregates By Slag Crushing Plant Reduces Lake Pollution

Near Gary, Ind., mountainous heaps of waste slag from the Carnegie-Illinois Steel Corporation's furnaces soon will be reduced to salable material for use as railroad ballast, in road construction and in various other ways as a cheap substitute for stone. A second purpose served by the project will be to remove what has been termed pollution of Lake Michigan by the slag dumped into the lake. The federal government has ordered the company to cease the practice.

The work of processing the slag will be done in a $200,000 crushing plant being built by the Gary Slag Corporation, which has contracted to dispose of the entire output of slag from the Gary works blast furnaces. This amounts to approximately 1,000,000 tons per year. The capacity of the crusher plant is expected to be about 400 tons an hour. Already installed are the footings, the huge concrete hopper which will receive the slag, a 165,000-ton primary crusher and a secondary crusher.

In charge of the plant is P. J. Mack, superintendent of the Gary Slag Corporation. R. Newton McDowell, president, also operates the Granite City (Ill.) Slag Corporation and the McDowell Stone Company at Blackwater, Mo.

Quarrymen Give Expert Aid On College Housing Project

When work on the veterans' housing project of the University of Missouri at Columbia was delayed by an unusual amount of rock at the location of a large sewer ditch, two local quarries supplied expert assistance.

Boone and McNaughton quarries sent "powder men" to aid in the unexpectedly large amount of drilling and blasting. The latter concern closed down in order to put its entire force to work on the university's housing project. Boone quarries pinch-hitters worked day and night to continue production at the plant and also help hasten completion of the sewer ditch.

• Colorado Constructors, Inc., of Denver operates a new Pioneer 46-VE Diesel-Electric Duplex Crushing and Screening Plant near Denver. A Caterpillar D-17-Y drives the jaw crusher through a 12-inch-wide flat belt and also drives an Electric-Machinery Company generator supplying electric power to motors on the vibrating screen and conveyors. The roll crusher is driven by V-belt from the jaw crusher. A new hydraulic-type cradle truck supports the delivery conveyor. Coarse aggregate is being produced simultaneously with 100 percent fractured chips, an exclusive Pioneer feature made possible by the bottom-deck feed.

Percussion versus Diamond Drills At National Gypsum's Bellefonte Mine

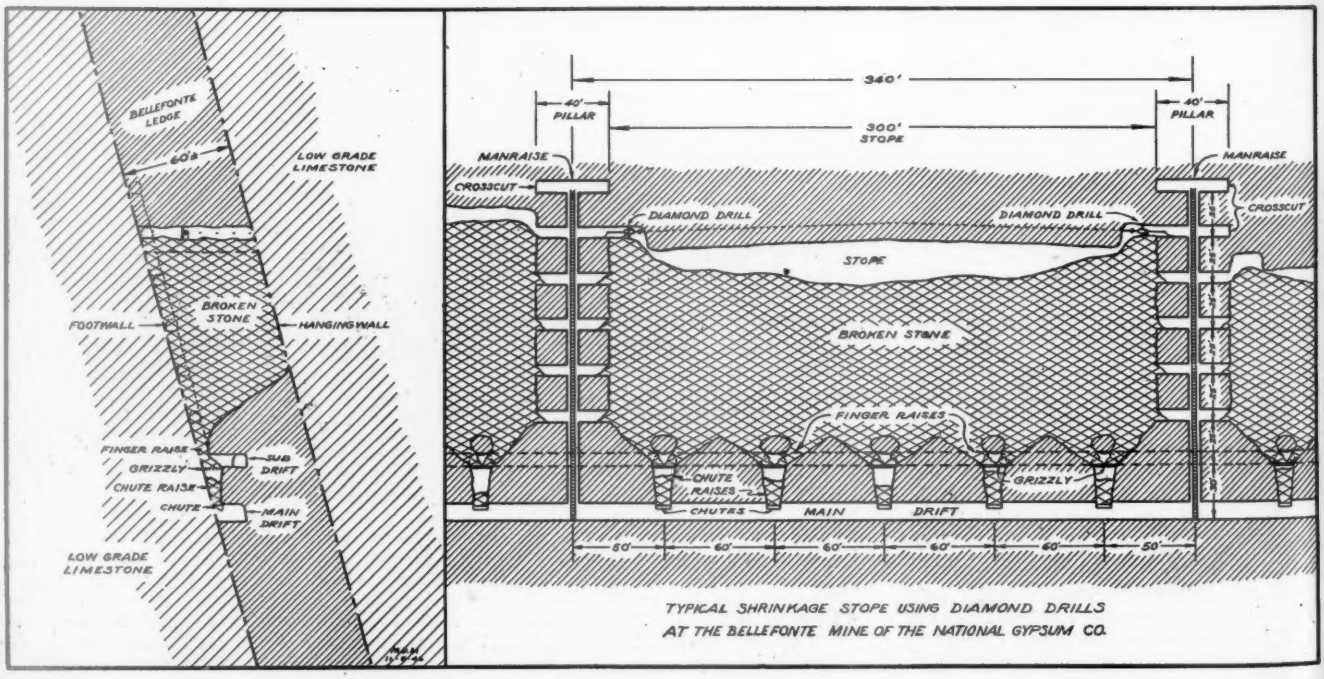
By KEITH W. WAUGH
Works Manager
National Gypsum Company
Bellefonte, Pa.

THE use of diamond blast hole drilling was started at the National Gypsum Company's high-calcium underground limestone mine at Bellefonte, Pa., in December, 1945. Since that time a variety of methods and equipment have been tried in order to determine the best method and best equipment with which to do the job. Since this experimental work is still in progress, it should be kept in mind that the data and experience discussed are only preliminary, and not necessarily conclusive. In addition it should be kept in mind that we have so far endeavored to fit diamond blast hole drilling into our present method of mining rather than to change our mining method to benefit from the advantageous characteristics of the diamond blast hole equipment. The rule will eventually be realized when more experience has been gained with the equipment.

A brief description of our mining method will probably help to visualize the mining conditions. Entrance to the mine is gained thru an incline on approximately minus 18 degrees slope, normal to the strike of the ledge, placing the main or haulage drift (driven along the footwall) approximately 350 feet vertically below the surface. From the main drift (Fig. 1) man raises are driven on 340-foot centers to 30 feet above track grade on the footwall. Slope lengths are 300 feet with chute raises driven to 30 feet above track grade on 60-foot centers, along the footwall, a 40-foot pillar being left between each stope. Mucking for main drift, chute raises and man raises is done by scraper slide, and chutes are installed at once. The sub-drift or monkey heading is driven on a grade 30 feet above the track grade of the main drift and approximately 20 feet inside footwall. Grizzly chambers are driven from the sub-drift over each chute raise to the footwall, and two finger raises are driven from each side of the grizzly chamber, funneling out into stope above. Man raises in pillars are also out into and continued to the maximum height of the stope with cross-cuts every 25 feet in both directions from the raise along the footwall. The stope block 300 feet long is then undercut to a width of approximately 37 feet, thus breaking into the grizzly finger raises. The stope is then considered developed and ready for mining to begin. The mining method used is shrinkage stoping, to which the character of the stone lends itself very well, as there is a definite black seam which delineates the hanging wall and generally a minor seam that can be followed for the footwall. Dilution generally is no problem. The thickness and dip of the Bellefonte ledge at our mine is from 55 to 70 feet and from 70 to 80 degrees respectively.

Until we changed to diamond blast hole drilling, stope mining was done with percussion drills by driving first from the footwall to the hanging wall along the pillar, and then following the hanging wall and taking a top slice with two machines (about a 12-ft. face), with some holes fanned out toward the center of the stope. Upon completion of this cut the same procedure is followed on the footwall. This allowed a certain amount of stone in the center of the stope to peel without shooting and consequently resulted in a great deal of secondary shooting and bombing on the grizzlies and in the finger raises to handle the large stone. Each complete slice is widened about ten feet until the full width of the stope is reached.

Using diamond drills, the development of the stope is done in much the same manner. In order to open the stope out to width, however, the diamond drill (see Fig. 2) is used by taking slices 140 feet long off the hanging wall side of the stope along



• Fig. 1. Diagrams of vertical (left) and horizontal (right) sections in the National Gypsum Company's mine at Bellefonte, Pa.

TYPICAL SHRINKAGE STOPE USING DIAMOND DRILLS AT THE BELLEFONTE MINE OF THE NATIONAL GYPSUM CO.

with a two-hole roof shot until the hanging wall is reached. The floor is maintained on about a 45-deg. slope up to the hanging wall. When full width is reached a slot approximately 14 feet wide and 14 feet high is made across the end of the stope adjacent to the pillar. This slot may be made altogether with percussion drills or a vertical raise may be driven 14 by 14 feet in the footwall corner at the pillar, and then the slot shot out by drilling to the hanging wall with the diamond drill. This shot would be three holes wide with two rows of holes. To date we prefer to use percussion drills for this slot. When the slot is completed the diamond drill (see Figs. 3 and 3A) is then used to drill parallel holes 140 feet long across the width of the slot. These holes carry 10 to 13 feet of burden and are spaced about 9 to 11 feet apart, being closer together near the hanging and footwall. Depending upon the condition found along the hanging and footwall, a relief hole may be used to help pull this corner.

Holes are loaded with 1¼- by 8-in. cartridges of the Gelodyn No. 3 type of powder, with the exception of the corner holes where Gelodyn No. 1 type is used. Experiments have been made with other types of explosives but this type seems to give best results when all factors such as gassing, handling and fragmentation have been considered. Hole loading is done with hook-jointed poles 5 feet long. The Redi-slit type of cartridge was not satisfactory as it tends to swell and plug the hole before loading is completed. Two primers were used at first, one with 100-ft. wires and one with 30-ft. wires, but only one with 60-ft. wires) is now being used. The use of delay shooting on these long holes has not proven satisfactory, and all holes are accordingly fired instantaneously.

Shots have been made using horizontal fan drilling (see Fig. 4) from a 14- by 14-ft. raise at the footwall pillar corner of the stope, but this type of drilling, while it reduces the time spent on making drill set-ups, requires more footage. To be successful it also necessitates careful engineering in laying out the holes properly. We also experienced blasting failures using this type of round.

Primary crushing is done underground (using a No. 7½ gyratory crusher), and the crushed stone is conveyed to the surface by belt conveyor. This size crusher forces us to set grizzly bars at 12 inches and good fragmentation in our primary shooting is of major importance.

Fig. 5 shows comparisons, based on our experience, between the percussion drill and diamond drills. The savings and increased efficiencies are quite apparent. Final figures will show a still better comparison in favor of diamond drills, since the figures used in Fig. 5 in-

• Above: Fig. 2. Slicing stope to width.
• Below: Fig. 3A. Set-up showing the slot for top-slicing.

• Above: Fig. 3. Top slicing with parallel holes.
• Below: Fig. 4. Horizontal fan drilling.

clude the time spent teaching operators and learning how to take advantage of the characteristics of the drill. All comparisons involving man hours are based on total man hours, which includes time spent cleaning roof, laying pipe lines, setting up, lunch time, travel time, getting dynamite to stope, loading holes, changing rods, moving out of stope to shoot, and actual drilling time. Also a machine shift has been recorded as 16 actual hours, since two men operate each machine.

Diamond drilling has a number of advantages over percussion drilling, Which will be discussed under the following headings:

1. Increased safety for miners.
2. Increased powder factor.
3. Better fragmentation.
4. Less capital expense.
5. Decreased maintenance costs.
6. Increased man-hour efficiency, requiring less man power.
7. Decreased supply costs.
8. Less fatigue.
9. More flexibility in drawing of stopes.

1. Although as pointed out above, definite operating efficiencies can be obtained through the use of diamond drills where they are applicable, probably the greatest point in their favor in our case is safety. By using diamond drills the miner is practically doing his work by remote control, since he is working under a small patch of roof which is easy to watch and keep barred down, and he is always alongside his stope pillar, not having constantly to maintain a barred-down roof out in his stope. We have actually mined stopes with diamond drills where the roof conditions were so bad that it would have been impossible to have mined using percussion drills.

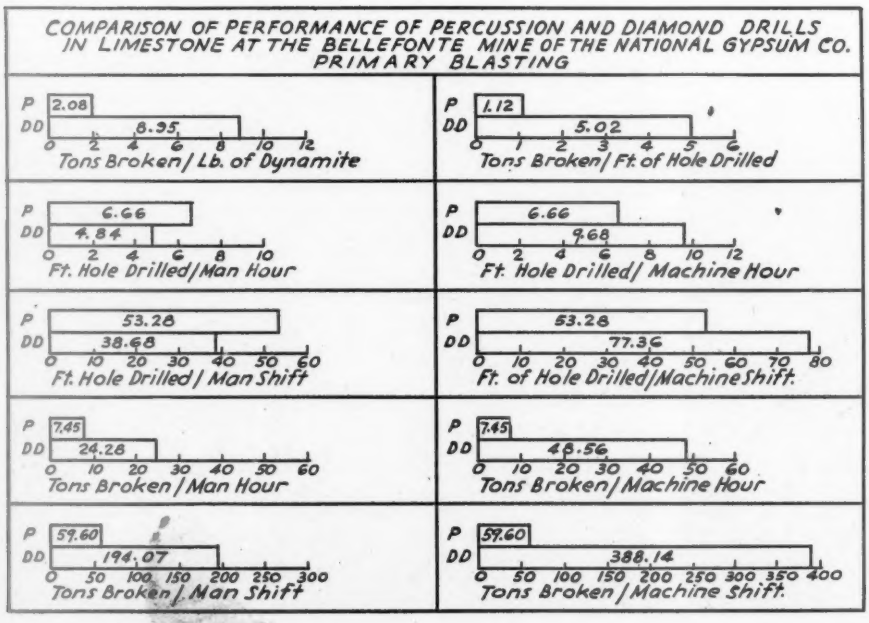
2. & 3. With a ratio of tons of stone per pound of dynamite of 8.95, one would expect to find usage of secondary dynamite had increased. However, quite the contrary has been found to be true. Usage of secondary dynamite on stone broken by means of percussion drills has averaged about 6.3 tons per pound over the past 5 years. Present usage of secondary dynamite on stone broken by diamond drilling is running around 8 to 9 tons per pound. Obviously this also means greater output per man hour on the grizzlies.

4. As far as initial cost is concerned, one diamond drill and accessories for drilling up to 200 feet of hole will represent a capital outlay of about $1200, as against about $500 for a percussion drill and its accessories. But since two percussion machines must also be supplied the two diamond drill operators for cutting slots, this means that capital outlay for diamond drilling is about $2200. On the other hand, the equivalent outlay based on tonnage per machine shift would be approximately $3200.

5. Maintenance of diamond drills has so far been indicated to be less than on percussion drills.

6. Increased man-hour efficiency with a decrease in man power required is indicated by referring to Fig. 5, which indicates that tons broken per man hour is 7.45 for percussion drills as against 24.28 for diamond drills. Actual maximum penetration speed of the HS 15 diamond drill is about 22 inches per minute, compared with a percussion drill rate of 18 inches per minute.

• Fig. 5. A graph showing the comparison, based upon experience, between results obtained with percussion drills and diamond drills.



Timed continuous runs have been made of 60 feet in one hour with diamond drills. Highest footage in one shift (which included pulling 150 feet of rod and making a new set-up) was 242 feet. Experience indicates, however, that a two-man crew can be expected to average 145 feet of drilling and one set-up per shift of actual machine drilling. Since safety regulations provide that one man should not work alone in a stope, a two man crew must be used; otherwise, there is no reason why one man could not operate one machine with a little help for setting up.

7. The main supplies necessary are diamond bits and drill rods. We have used LM Concave and Pilot type as well as EX Concave and Pilot type and as yet have not proven to our own satisfaction which type is preferable, except that an EX hole is probably better than the LM hole for loading purposes. Whether the pilot is better than concave remains to be proven. We are working with two bit manufacturers to develop the best setting, type of waterways and so forth, but have not reached any conclusions as yet. The following footages are indicative of our results so far:

1 LM Concave—5700 ft. dia. loss 2 carats
1 LM Concave—3200 ft. dia. loss 3 carats
1 LM Pilot—377 ft. dia. loss negligible (lost gage)
1 EX Pilot—5300 ft. dia. loss 1.26 carats
1 EX Pilot—6400 ft. dia. loss 5 carats
1 EX Pilot—7400 ft. dia. loss 2.5 carats
1 EX Concave—4200 ft. dia. loss 2 carats
1 EX Pilot—3100 ft. dia. loss 3 carats (lost gage)

Diamond costs are presently around $9.00 per carat and setting charge is $6.00. From these figures it is obvious that cost of diamond bits per foot of hole is considerably less than cost of jack-bits. Similarly since our experience so far indicates that one set (150 feet) of drill rods will drill in excess of 20,000 feet of hole, this item is far cheaper than drill steel for percussion type drills.

8. The fatigue factor has been reduced greatly by several differences between the two operations. Probably the most fatiguing job a miner has to do is to bar down loose roof and this is reduced to the minimum by diamond drills, since only one small portion of the stope must be kept safe. In addition the number of drill set-ups has been greatly reduced with a corresponding drop in

(*Continued on page* 70)

Electric Rock Wool Furnace Results in Low-Cost Operation and High Output

another ON THE SPOT report

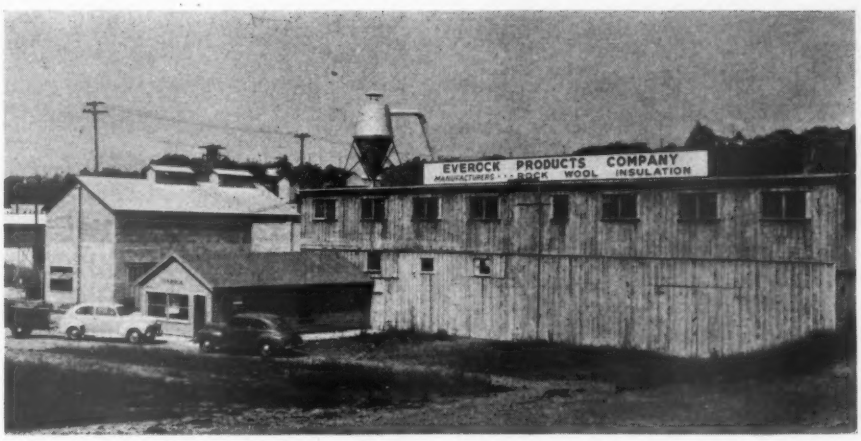
AN improved method of producing mineral wool is employed in the new plant of Everock Products Co. at Tacoma, Wash., which went into operation early in 1946 after a period of experimentation.

Instead of the water-jacketed cupola used in most wool plants, where-

By HARRY F. UTLEY

in alternate layers of rock or slag and coke are charged into the cupola and fired to reduce the raw material to a molten state, the Tacoma plant uses a modern induction-type electric furnace, allowing the process to be continuous.

The plant and the furnace were designed by C. H. St. John, owner and operations manager. Temperatures ranging between 2,600 and 2,700 deg. F. are maintained within close limits by automatic pyrometric control. The furnace is lined with Harbison-Walker high-temperature refractory brick and is capable of producing from 10 to 15 tons of mineral wool per day.



• The plant of the Everock Products Company at Tacoma, Wash., one of the newest mineral wool producers in the Pacific Northwest.

In contrast to the intermittent-cupola method which uses large pieces of rock, the raw material used in the electric furnace at Tacoma consists of relatively fine ingredients —silica sand and pulverized limestone—both of which are purchased in paper bags and carefully proportioned into the furnace feed by a formula worked out by Mr. St. John. A small amount of glass scrap is added as a flux, and as the mass becomes molten, it is allowed to escape through three orifices in Carborundum blocks at the bottom of the furnace. The molten material is blown into wool at this point by compressed air under 100-pound pressure. The use of compressed air for blowing, too, is a comparatively recent innovation, live steam being employed in most wool plants. However, by using air, the pressure can be maintained constantly within close limits, and chilling of the molten stream as the air strikes it is eliminated by pre-heating the air electrically. An Ingersoll-Rand compressor and air receiver are housed in a separate room.

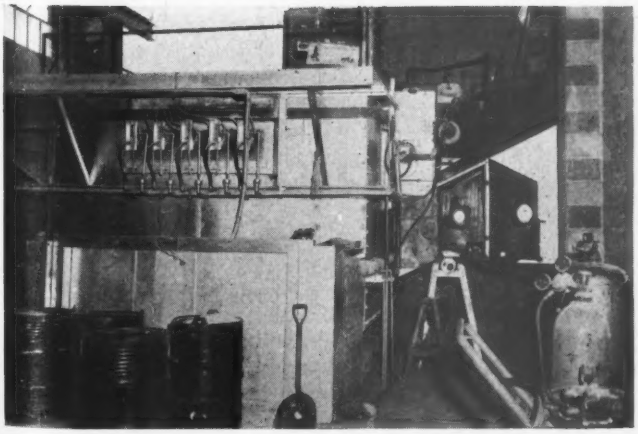
As the hot air strikes the molten stream, the wool mass balloons upward and outward, settling in a layer on a wire-mesh conveyor 52 inches wide and 45 feet long form-

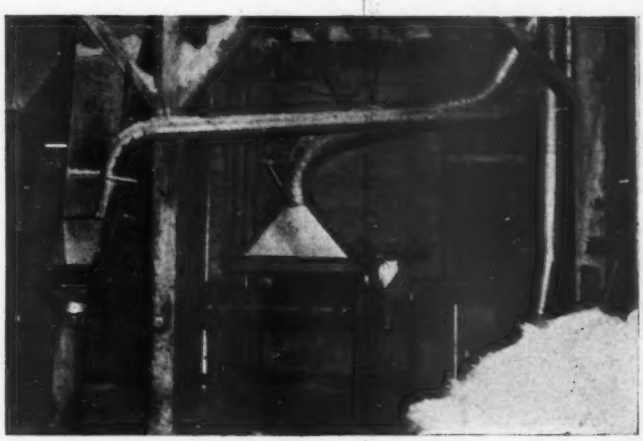
(*Continued on page* 70)

• Left: This view shows, through the window, the revolving screen which removes the "shot" from the wool. The cyclone above feeds the screen.

• Below, left: An induction-type electric furnace which melts the raw material. The wool is blown through the tunnel at the right.

• Below, right: An interior view, showing the conveyor from the furnace (right) with the pipe which carries the wool up to the cyclone and screen. The bagging spout is at the left.



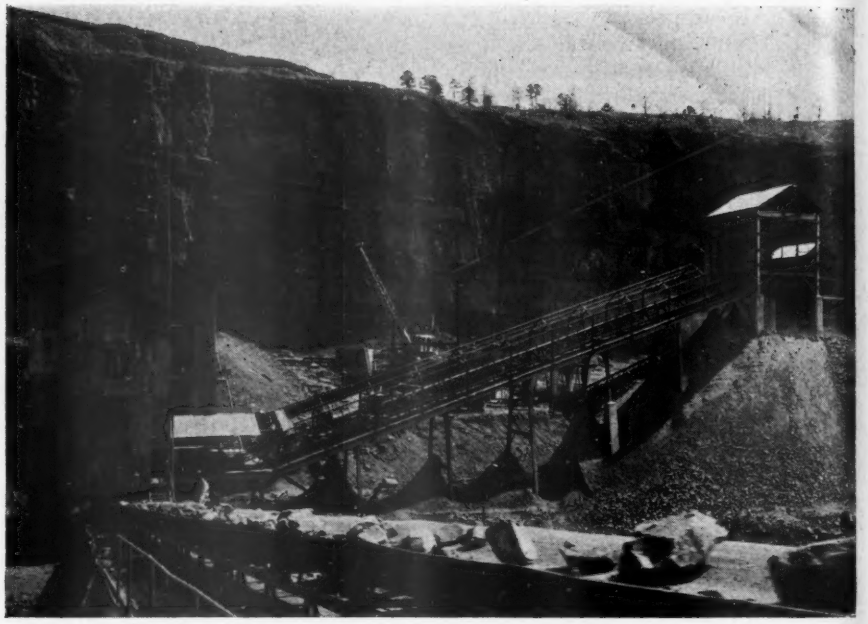


1500 Tons of Riprap Produced Daily At Newly-Mechanized Arkansas Plant

another ON THE SPOT report

FOR many years the Big Rock Stone & Material Company at Little Rock, Arkansas, has produced large quantities of riprap used in revetment work, employing 75 men in what was essentially a hand labor operation. Riprap was produced in addition to, and wholly apart from, the operation of a conventional stone crushing plant with a capacity of approximately 300 tons per hour. During the war period, when the company became mainly dependent upon prisoner-of-war labor, production of trap rock slumped materially and soon the accumulation of back orders totalled 330,000 tons, mostly for the U. S. Army Engineers.

Since mechanization of the operation had been definitely contemplated before the war, and a high priority was assured because of the importance of the projects awaiting shipments, about two years ago a completely modern riprap plant was erected on the floor of the quarry. During the first year's operations the new plant, in addition to supplying all current demands, enabled the company to eliminate completely the accumulated backlog of orders. Production of riprap jumped to 1,500 tons per 8-hour day, more than double the highest output ever attained with hand labor, and this was accomplished with only 5 men in contrast with the 75-man crew formerly employed. This startling increase in labor efficiency is not by any means unique, but on the contrary merely confirms the experience of most producers who have mechanized their quarry operations.



• A general view of the Big Rock Stone & Material Company's new riprap plant at Little Rock, Ark. The runout conveyor at the right feeds undersize material to the reclaiming tunnel for the stone plant.

• R. S. Wilson (left), president of the company, and W. F. Tracy (right), superintendent, inspect the loading of a tunnel. The company makes about four tunnel shots per year. Excellent breakage and considerably less secondary shooting than with well shots are reported. The tunnel pictured has a 3- by 5-foot cross-section. The drift is 64 feet, with a 40-foot right wing and a 30-foot left wing. Charged with 14,000 pounds of dynamite, the shot was expected to bring down at least 100,000 tons. The quarry face is 206 feet high at this point.

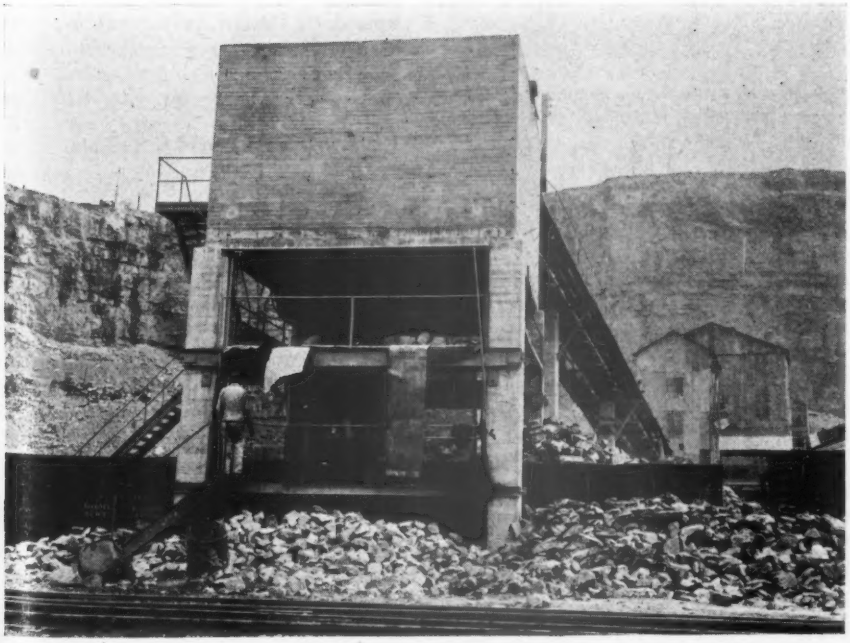
From 3 to 7 trucks have been used for hauling run-of-the-quarry stone from the face to the plant, an average distance of approximately 360 feet. About 75 percent of the movement is handled with three recently purchased TR-10 Easton semi-trailers, drawn by 87-Q Hug tractors. A special dumping bridge incorporating an Easton elbow-type dumping mechanism, will make it possible to feed the plant with both the Easton trailers and with conventional end-dump trucks. The Easton units are now in service feeding a 42-in. gyratory crusher which effects the primary reduction for the main crushing plant. The Easton model HE-16 automatic hoist at this crusher is motor operated and incorporates a solenoid brake, an adjustable up-and-down limit switch, a separate control panel and a three-unit pushbutton station. As the trailer coasts into position on the dumping bridge, the hoist operator pushes the "raise" button which automatically engages the dumping hook with the side of the trailer, and the trailer body is raised into the discharge position. A similar pushbutton operation returns the emptied body to its normal carrying position, automatically disengaging the hook so that the trailer moves on with the minimum delay. The operator may

• Above: A view of the 42- by 48-inch jaw crusher.

• Left: The crusher is fed by a 4- by 10-foot apron feeder.

• Below, left: Plus 6-inch or plus 8-inch rocks are scalped off on a 6- by 10-foot single-deck vibrating screen.

• Below, right: The runout conveyor is loaded with a vibrating feeder.



stop the hoist at any point in the dumping cycle in order to prevent choking or bridging at the crusher. The use of this type of dumping mechanism, as compared with self-contained hydraulic equipment, reduces the weight of each trailer unit by about 1,000 pounds.

The trucks are loaded at the quarry face with two Bucyrus-Erie electric-powered shovels, one a 100-B 3-cubic-yard machine, the other a 54-B 2½-cubic-yard.

The trucks dump into a 4- by 10-foot Stephens-Adamson apron feeder, by which the stone is fed to a 42- by 48-inch Allis-Chalmers jaw crusher. The material drops from the crusher into a 42-inch by 80-foot

• Cars are loaded from a 175-ton all-concrete bin. The gates are air-actuated, with controls located behind the screen to shield the operator.

• The 2½-cu.-yd. shovel loading one of the new 10-cu.-yd. trailers with which 75 percent of the stone is now being moved from the quarry face to the crushing plant.

• One of the semi-trailer units is here shown spotted under the elbow-type dumping mechanism at the feed end of the main crushing plant. The crusher, which is a 42-in. gyratory, can also be fed with end-dump units from the lower level.

inclined belt conveyor connecting the crushing building with a separate screening building. A single-deck, 6- by 10-foot Ty-Rock vibrating screen scalps off the riprap, which drops onto a No. 5 Jeffrey vibrating feeder and is loaded onto the 48-inch by 165-foot runout conveyor.

Either plus 6-inch or plus 8-inch rocks are marketed as riprap, depending on the particular specification being met. The smaller size weighs up to 150 pounds, and the larger up to 250 pounds. The plant can be shifted from one size to the other by substituting the proper size screen section. In either case the throughs (minus 6-inch or minus 8-inch) are removed from the flow on a cross conveyer set at 90 degrees to the riprap plant, and are discharged over a reclaiming tunnel from which the general crushing plant is fed. The tunnel has a 7- by 10-foot cross section and is 125 feet long.

The runout conveyor discharges the riprap into a 175-ton all-concrete car loading bin. Because of the size and weight of the material being handled, the bin gates are operated by 8- by 36-inch, double-acting tandem air cylinders. Twenty 60-ton cars are usually loaded in an 8-hour day.

No provision has been made for stockpiling riprap, since the entire output of the quarry can, when necessary, be routed to the stone plant. With the steadily increasing demand for riprap in connection with revetment work, there seems little likelihood that many idle hours will be charged to the new plant. If demand does fall off briefly, it is a simple matter with the new set-up to route some of the trucks to the stone plant, thereby keeping the two shovels in constant production.

With some variation from different sections of the quarry, the material has been splitting around 45 percent riprap to 55 percent stone—a much higher yield in favor of riprap than the company had dared to hope for. Mechanized handling has also effected a sharp reduction in breakage with hand operations.

W. F. Tracy is superintendent of the company and H. R. Houchins is quarry superintendent. A new stone plant is also under construction at this company's quarry, and is expected to go into operation shortly.

Percussion vs. Diamond

(*From page* 66)

fatigue. Another job which has been curtailed is the moving of all equipment back to a protected location each day in order to shoot daily. With diamond drills this is required only once each shot, or once in 10 days or two weeks.

9. Much greater flexibility is allowable in drawing stopes when using diamond drills, since the muck pile in each end of the stope from which the miner works is the only part of the pile that must be maintained in height. The center of the stope can be drawn without regard to shrinkage.

Electric Furnace

(*From page* 67)

ing the floor of the wool room, a tunnel-like structure connecting the furnace and packing buildings. At a point near the end of this conveyor within the packing room, the wool is picked up by vacuum and carried to a cyclone above the building and discharged to an inclined revolving screen to remove any "shot" which may be present. As the wool passes the suction fan in the circuit, it is pelletized by the fan blades to a degree which makes it suitable for a wide range of insulation purposes. This is the only form in which the wool is marketed, no raw wool,

(*Continued on page* 72)

Many U. S. Nonmetallics Discussed at A. I. M. E. Meeting in Columbus

another ON THE SPOT report

THE fall meeting of the Industrial Minerals Division of the American Institute of Mining and Metallurgical Engineers was held at the Deshler-Wallick Hotel in Columbus, O., on October 23 and 24. Fourteen papers were presented, and the members were able to make one of two field trips on the afternoon of the second day. More than 50 members of this division of the A.I.M.E. attended the meeting.

The first morning was devoted to the registration of members and their guests, followed by a luncheon. J. R. Van Pelt, Jr., a vice-president and director of the A.I.M.E., and general chairman of the meeting, made a short address of welcome. During his talk he introduced both Professor W. A. Mueller, who made the arrangements for the meeting, and Clyde E. Williams, president-elect. After the address, the group adjourned until the afternoon meeting. J. L. Gillson and R. M. Foose were co-chairmen at this meeting.

Dr. J. L. Stuckey, of North Carolina State College, presented the first paper, entitled "Industrial Minerals of North Carolina." Co-authors were C. E. Hunter, geologist, TVA, and T. G. Murdock, mining engineer and geologist. In his paper, Dr. Stuckey explained that North Carolina is not a great mineral producing state, but has many non-metallic ores. Using lantern slides at intervals, he showed how the state is divided into three parts, the Coastal Plain, the Piedmont Plain, and the Mountainous Section. Along the coastal plain, deposits of sands, clays and shell limestones are found, while in the Piedmont and mountain districts granites, sedimentary formations and pegmatite dikes are the main sources of minerals. Twelve plants in this last area produce 60 percent of the United States yearly output of scrap mica. Seven plants here produce 25,000 tons of ground mica, and four plants turned out two million pounds of sheet mica (1943). A large part of the kaolin produced in the United States comes from North Carolina. Four main plants are washing this material, with estimated reserves of 50 million tons of kaolin still in the ground. Six plants are producing 60 percent of the United States feldspar output, and in all, there are 36 large plants processing pegmatite minerals. There are also large deposits of basic magnesia rocks in North Carolina. The state, with some TVA aid, is now attempting to make the impure mineral deposits of the region more valuable.

Robert H. Dott, Director of the Oklahoma Geologic Survey, talked on the "Industrial Minerals of Oklahoma." He stated that there are many high grade mineral deposits in his state, with an abundance of high grade low cost fuels—natural gas, petroleum and bituminous coal. He then went on to enumerate the twelve most important minerals, with their location in the state and their use.

"Barite Deposits of Central Missouri" was the topic of the paper presented by W. B. Mather of the Midwest Research Institute. After a study of 300 deposits of six types in a limited area of Central Missouri, Mr. Mather reached conclusions on the geologic origin and cause of the deposits. He explained his theory on the subject, and gave data on the barite industry in the state.

In a paper entitled "Texas White Firing Bentonite," F. K. Pence, Dept. of Ceramic Engineers, University of Texas, discussed the ceramic applications of this ash, which is found in large quantities near San Antonio. Porcelain made with this material has a longer period of plasticity, increased drying time, and a better glaze fit, but the porcelain is not quite as white as with other material.

Dr. J. L. Stuckey then took the floor to deliver his second paper, entitled "North Carolina Kaolin," in which he discussed the history of the deposits, and the process and history of mining kaolin, from the time of the first settlements until the present day.

G. W. Josephson, Asst. Chief, Nonmetal Economics Division, U. S. Bureau of Mines, delivered a report entitled "Some Observations on Clay Mining in Germany."

The last paper of the afternoon was "Refining of Silica Sand for Glass Manufacture," by E. C. Sawyer, Service Engineer, Central Silica Co. In his report, he told where good glass sands are found, and gave the characteristics of each sand mentioned.

The New Jersey sand is said to be a good example of sand occurring in nature with few impurities. The only processing necessary on this sand is to wash out the impurities, table and dry it.

The Ottawa sand of Illinois is hard enough to present a vertical face in the quarry, but can be disintegrated into sand by blasting and is then mined hydraulically. Since the elements other than silica are usually found in the coarsest and finest sand, extensive screening is done in connection with washing, and the glass sand is obtained from the "in-between" sizes.

None of the Ohio sands are good enough for high quality glass when cleaned by the usual washing and separation methods, due to an impure grain coating.

Pennsylvania sand is pure enough to need only washing.

At the Glass Rock plant of the Central Silica Co., using Ohio sand, most of the grains used are on 50 and 70 mesh screens, which is close to the national average. About 4 percent clay is removed in the washing process, leaving as the main impurity .070 percent iron oxide. Acid treatment reduces this to below .020 percent, and sometimes as low as .010 percent.

Mr. Sawyer then described the operation of the Glass Rock plant. The sand rock for this plant is quarried much as one would quarry limestone, and is placed in trailer trucks by power shovels and hauled to the mill, where the rock is dumped onto a vibrating grizzly. The oversize goes through a jaw crusher, and the undersize and the crusher product are then discharged into concrete silos. These in turn feed into a chaser mill which breaks the rock into sand without breaking the grains. This sand is then scrubbed in rotary screens, grain against grain. The product of these screens passes through rubbing and dewatering screws, which remove clay and fines, and the washed sand is then pumped through a rubber-lined centrifugal pump to a surge tub, and then to flotation cells. Caustic soda, fuel oil, fatty acid and pine oil are used as flotation reagents. After the primary impurities have been floated off, the balance of the sand is dewatered to about 7 percent moisture, and is then superheated to about 275 deg. F. Concentrated sulphuric acid and water are added

(25 pounds of acid to one ton of sand). At about 220 deg. F. the sand is conveyed to large redwood tubs, where steam is forced into the sand. (At temperatures higher than 220 deg. F. the iron sulphate will be decomposed into an insoluble compound.) The iron sulphate and excess acid are washed out after sufficient steaming, and then the sand is flushed out the bottom of the tubs, and is dewatered, dried and screened. The minus-20-mesh material is then ready to be shipped as glass sand, or enamel or setting sand. It may also be ground in Silex-lined pebble mills into flint for potteries.

The afternoon meeting was adjourned, and the delegates met again in the ballroom for an informal dinner. Dr. Marion Llwellyn Pool, of the Physics Department, Ohio State University, showed motion picture of atomic bomb tests, Able and Baker at Bikini, and made a brief comment on the films. Mr. Van Pelt presided at the dinner.

Oliver C. Ralston and George W. White were co-chairmen of the second session, which was held in the morning, October 24. The first paper was presented by Carl A. Bays, geologist and engineer, Head of Groundwater Geology and Geophysical Exploration Division of the Illinois Geological Survey. The paper was written in cooperation with Merlyn B. Buhle and Robert N. M. Urash, also of the Illinois Geological Survey. Entitled "Electrical Prospecting for Sand and Gravel," the paper described a method used by the authors as an aid in locating sand and gravel deposits. Making use of a resistivity contrast of from ten to one to several hundred to one in Illinois glacial drift, deposits could generally be located with accuracy, providing the materials tested contained fairly equal amounts of fresh water. Saline solutions made the readings obtained valueless, and so prohibited the use of this method where they existed.

In practice, four electrodes are placed in the ground in a line, and a 90-volt current is applied across the outer two electrodes. The potential across the inner two electrodes is then measured, and it is from this reading that depths are determined. By moving the electrodes, readings can be made at varying depths. A high reading indicates sand or gravel. In making a survey of this sort, readings are generally taken at 2-foot intervals, to a depth of 50 feet. Fourteen- to 18-cycle current is used, so little difficulty has been experienced with 60-cycle resistance, as from power lines. The principal interference difficulty has been caused by wire fences, and this can be easily overcome by placing the electrodes normal to the fence.

The equipment is light, weighing only 39 pounds, and can be carried in the back of a passenger car. In this case the car battery can supply power for the equipment through a power pack.

The results of the experiments have been checked by drilling, and have been found to be accurate. In addition to locating deposits, the equipment will enable some conclusions to be drawn as to the thickness of the deposit, and also as to the location of the water level.

One advantage of this method is that large areas can be quickly and inexpensively accepted or rejected as prospective sites for drilling operations.*

"Sharon Conglomerates and Limestone of Northeastern Ohio" was the title of a paper delivered by J. O. Fuller and M. T. Sturgeon, co-authors, of the Ohio Geological Survey. This formation is actually a sandstone with pebbles, rather than a conglomerate, as it is usually referred to. Dr. Sturgeon gave the geologic description of the formation, while Dr. Fuller spoke on the economic aspects of the rock.

In a paper entitled "Industrial Limestones of Eastern Ohio," written by Raymond E. Lamborn, assistant, Geological Survey of Ohio, and George W. White, Department of Geology, Ohio State University, Dr. White discussed the entire series of limestones underlying the state. He considered them in the order of their deposition, and spoke on their economic and geological aspects.

Felix B. Shay, assistant to the president, Foote Mineral Co., read a paper on "Materials Used in Germany During the War for Welding Rod Coatings." He gave a brief history of arc welding in that country, and brought out the fact that the allied blockade had forced the Germans to go to more and more simple formulas for their coatings, due to the shortage of vital raw materials.

"The Laboratory Beneficiation of Fluorite Ore From the Minerva Oil Co., Eldorado, Ill.," was the title of a paper presented by the author, M. M. Fine, metallurgist, Rolla Division, U. S. Bureau of Mines, who co-authored the paper in cooperation with R. G. O'Meara, senior metallurgist. Flotation methods were used to beneficiate the ore in question to produce a higher quality product for certain war time uses.

"The Beneficiation of Waste Porcelain Enamel" was the topic of a paper written by Donald W. Scott, L. H. Roe (speaker), and B. J. Sweo, all of the Battelle Memorial Institute.

Donald W. Scott presented the last paper, on the "Effect of Calcination on the Grindability of Aplite Rock and Three of Its Mineral Components." A. C. Richardson, Battelle Memorial Institute, was a co-author of this work, which revealed that there is a non-reversible transition point for aplite, between 1,650 and 2,000 deg. F. A permanent expansion deformation took place there which improved the grindability.

The meeting was adjourned, and the members did not meet in formal session again, but went in the afternoon on the two field trips that had been arranged. One of these was to the Battelle Memorial Institute, and the other was to the plant of the Ayers Mineral Co., near Glass Rock, O.

At Battelle, the facilities of the institute were thrown open to the guests, and a conducted tour was made through the various laboratories. The members exhibited particular interest in the minerals testing facilities and the ceramic laboratory.

*Editor's note: See September, 1945, PIT AND QUARRY, page 77, for a description of similar work and equipment.

Electric Furnace

(*From page* 70)

batt, or blankets being manufactured.

The screen previously mentioned is of large diameter, about 6 feet, is 8 feet long and carries ⅛-inch mesh wire cloth. As the finished mineral wool is discharged off the screen, it receives a light oil spray and is ready for packaging. It drops into a hopper with an 8-inch pipe and cut-off gate at the bottom which is used for filling the paper bags in which the product is shipped. The bags are weighed on a small Fairbanks platform scale and tied; each contains 40 pounds of wool.

Shipments are being made to Seattle, Portland, Spokane and other points in the Pacific Northwest.

Electricity is supplied to the plant from the lines of the Tacoma municipal system and the cost is extremely low, Mr. St. John reports, making the use of the electric furnace highly practical. Tacoma's light and power rates are, incidentally, said to be among the lowest on record in the United States.

Only four men are needed to operate the plant at capacity on a shift. Operations have been on an around-the-clock basis at times to supply the demand.

THE STRUCTURE AND MINERALOGY OF BLAST FURNACE SLAGS-- PART I

By D. G. RUNNER
Materials Engineer
U. S. Public Roads Administration

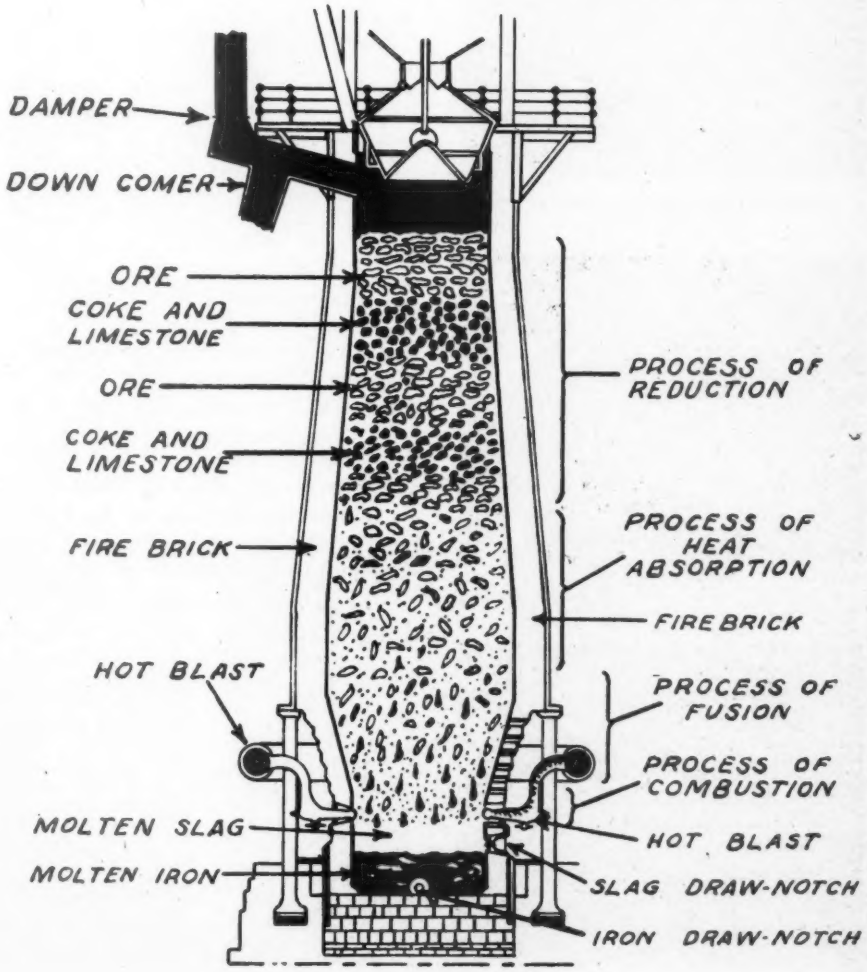
another P and Q exclusive

A FEW years ago a paper on the origin and properties of blast furnace slag[1] appeared in one of the trade magazines. This article contained a brief account of how blast furnace slag was produced, and discussed some of its physical and chemical properties with the thought of indicating why such material had been successfuly used for a great many years in construction work, sewage disposal plants and in other fields. During the last twenty years over one hundred million tons of blast furnace slag have been used in the many fields of the construction industry.

In order to refresh the memory of the reader regarding the character of the material under discussion, blast furnace slag may be defined[2] as the non-metallic product consisting essentially of silicates and alumino-silicates of lime and of other bases, which is developed simultaneously with iron in a blast furnace. In breaking down this definition it may be further stated that chemically, slag is composed chiefly of lime (CaO), silica (SiO_2), alumina (Al_2O_3) together with smaller amounts of magnesia (MgO), sulphur (S), iron oxide (FeO) and manganese (MnO). As may be expected from the very nature of the product, the chemical composition of any given slag is dependent upon the raw materials charged to the furnace, and consequently the percentage composition of the oxides listed above may vary from time to time.

The formation of slag starts in the blast furnace, where slag and iron are produced simultaneously. Layers of fluxing stone (limestone or dolomite), coke, iron ore and sometimes scrap iron and open-hearth slag are placed in the furnace through an opening at the top, and the mass then subjected to blasts of preheated air. It is during combustion of the coke that the gangue of the iron ore is separated from the metallic iron and is combined with the fluxing stone, and this combination produces the blast furnace slag. At the conclusion of the run, the molten slag and iron separate due to the differences in specific gravities, with the slag floating on the iron. The slag and iron are drawn off through suitable notches in the side of the furnace. Fig. 1 is a diagrammatic sketch of a blast furnace showing the layers of the charge in the body together with the slag and iron notches.

Regarding the physical characteristics of blast furnace slag,[3] it "is a rough, angular aggregate varying in color from light to dark gray, depending upon the character of the materials charged to the furnace. The roughness is due to its cellular structure, and the degree of roughness varies as the cells are large or small, many or few. These cells are formed by gases occluded in the slag at time of cooling, and are generally non-communicating; hence the term 'cellular' or 'vesicular' is more applicable than the term 'porous.' As excavated from the pit or bank, slag breaks into roughly-cubical pieces containing practically no flat pieces or slivers. This angularity, combined with its rough surface texture, gives slag a large surface area per unit of volume." The character of the slag as indicated above is reflected in the physical properties exhibited during or under tests. The bulk specific gravity ranges from 1.80 to 2.80 with an average of about 2.25. The true specific gravity (on powdered material) ranges between 2.90 and 3.10. The capacity of a mineral aggregate to absorb water is an important characteristic, and from a great number of tests, the absorption of slags ranges between

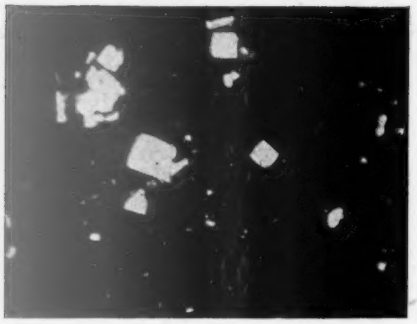


• Fig. 1. A diagrammatic sketch of a blast furnace, showing the layers of the charge and the slag and iron notches.

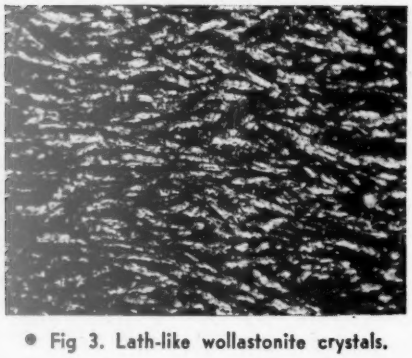
1) *"The Preparation and Properties of Blast Furnace Slag,"* by D. G. Runner, *Roads and Streets*, vol. 81, no. 3, March, 1938.

2) See *American Society for Testing Materials Specification* C125-44.

3) *Blast Furnace Slag as Concrete Aggregate*, Report of Committee 201, American Concrete Institute.

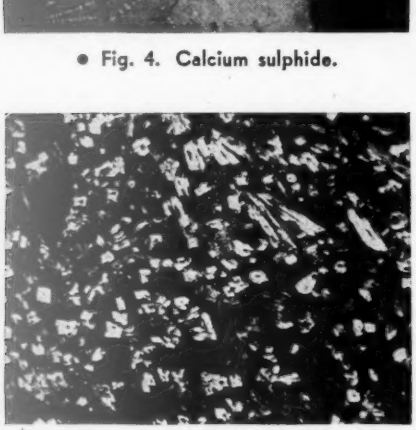


• Fig. 2. Melilite crystals.

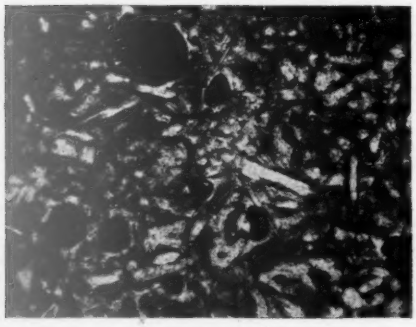


• Fig 3. Lath-like wollastonite crystals.

• Fig. 4. Calcium sulphide.



• Fig. 5. Calcium orthosilicate crystals.



• Fig. 6. Olivine crystals.

2.90 and 3.80 percent. The ability to resist abrasion is another attribute which is somewhat dependent upon the characteristics of an aggregate. Although certain slag samples may exhibit fairly high values in the absorption test, the range of abrasion losses in the Deval machine is in the neighborhood of 8.0 to 16.0 percent. Results of abrasion losses in the Los Angeles machine range from 25.0 to 40.0 with an average of about 32.0 percent.

In considering the chemical composition of blast furnace slag, the ores furnish the silica, alumina, iron, sulphur, and manganese; the coke also supplies silica, alumina, and sulphur, while the fluxing stone is responsible for supplying the lime and magnesia content. A high magnesia content in slags is usually attributable to the use of dolomite as a fluxing agent. The following table presents some average values on the chemical composition of slags.

SiO_2	Al_2O_3	CaO	MgO	S	FeO	MnO	Authority
36.4	12.7	41.3	6.5	1.5	0.8	0.9	Hubbard
36.0	12.0	41.5	6.5	1.5	0.5	0.8	National Slag Assn.
37.8	12.8	40.2	7.3	1.0	.....	0.4	Hubbard

The oxides listed above, under processes completed in the blast furnace, combine in various proportions to form different minerals under existing conditions. Many minerals have been found in crystalline blast furnace slag, although in some instances their definite composition may be clouded in doubt. From all indications, the more basic compounds are predominant in slags containing a high lime content, and the less basic compounds are prevalent in the low-lime slags.

In connection with a discussion of the minerals commonly found in blast furnace slags, the following table lists the ones most likely to be found in American slags. It should be pointed out, however, that each of these minerals will not be found in every slag sample examined. As previously emphasized, changes in the raw material charged to the furnace, temperature of fusion, rate of cooling, etc., will suffice to produce different mineral combinations.

Mineral	System	Specific Gravity	Hardness	Composition
Melilite[a]	Tetragonal	2.9—3.1	5	$Ca_2(MgFeAl)(SiAl)_2O_7$
Wollastonite	Monoclinic	2.8—2.9	4.5	$CaSiO_3$
Calcium-sulphide[b]	Isometric	2.58	4	CaS
Calcium-orthosilicate	Monoclinic?	2.9—3.3	5—6	Ca_2SiO_4
Periclase	Isometric	3.7—3.9	6	MgO
Olivine	Orthorhombic	3.2—3.4	6.5—7	$(MgFe)_2SiO_4$
Glass	Amorphous	.....	.....	Variable

a One of the gehlenite-akermanite group.
b Also called "Oldhamite."

Melilite, one of the chief minerals found in blast furnace slag, is an isomorphous mixture in which Ca and Al are found at one end and Ca and Mg are found at the other end. Gehlenite has the formula $Ca_2Al_2SiO_7$ while akermanite may be expressed as $Ca_2MgSi_2O_7$. The specific gravity of these minerals ranges from 2.90 to about 3.10, which may explain the relatively-high specific gravities of some slags. Melilite crystallizes in the tetragonal system and is usually found in short square prisms or elongated tetragonal tablets. The color may be white, brownish, pale yellow or greenish. Pleochroism is distinct in the yellow varieties. Melilite may be distinguished in thin sections by its moderate refraction, low interference colors, sometimes showing the striking "ultra blue." The mineral has parallel extinction and "peg structure" which are two of its characteristic features. Figure 2 shows the typical square section of melilite crystals embedded in a dense glassy groundmass. Gehlenite and akermanite, end members of the isomorphous series, also crystallize in the tetragonal system.

Wollastonite ($CaSiO_3$) is a calcium silicate mineral crystallizing in the monoclinic system. In thin sections it usually appears in fibrous or columnar aggregates, the cross sections of which are nearly rectangular. The extinction is parallel or almost parallel in longitudinal sections, but oblique in cross section. The birefringence is rather weak, and the maximum interference color is near orange of the first order. Sections along the longitudinal axis may show gray or white interference colors. Fig. 3 shows the lath-shaped crystals of wollastonite.

Calcium sulphide (CaS), also known as oldhamite, crystallizes in the isometric system and is usually found as small spherules or nearly

(*Continued on page* 83)

Iowa Sand and Gravel Producer Opens Well-Designed Year-Round Plant

another ON THE SPOT report

IN August of this year, the Concrete Materials Company of Waterloo, Ia., put into operation a new $400,000 sand and gravel plant near the Raccoon River in West Des Moines, Ia. This plant is one of the largest in the Middle West and is one of four plants operated by the company.

Harry D. Bellamy, founder and president of the company, has been actively engaged in the sand and gravel business for the past 40 years, and is currently operating other plants at Eddyville and Waterloo, Ia., and Byron, Ill. Mr. Bellamy also has an interest in operations in Iowa, Missouri, Illinois, and Kansas. The Concrete Materials and Construction Company of Cedar Rapids is the largest with 19 plants producing more agricultural limestone than any other single company.

The new sand and gravel plant was designed by T. E. Rust, vice-president, to produce washed sand and gravel which will meet state highway specifications, brick and plaster sand, concrete sand, all sizes of screened gravel, and concrete mixtures containing designated percentages of sand and gravel. Facilities have been provided for mixing and stockpiling these special mixes of concrete aggregates.

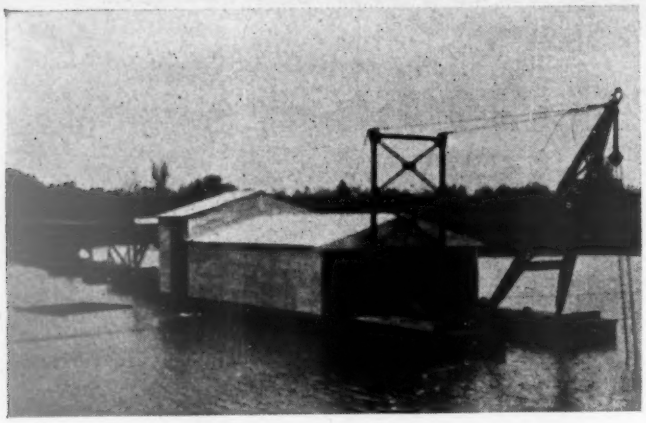
Basically this operation consists of two plants, the field scalping plant and the gravel processing plant, which are about ¼ mile apart. The field scalping plant includes the dredging, scalping, and sand processing operations and the gravel processing plant consists of screening, washing, crushing, and grading of the gravel. The gravel plant location is adjacent to the storage bins and stockpiles for all finished materials and aggregate mixtures.

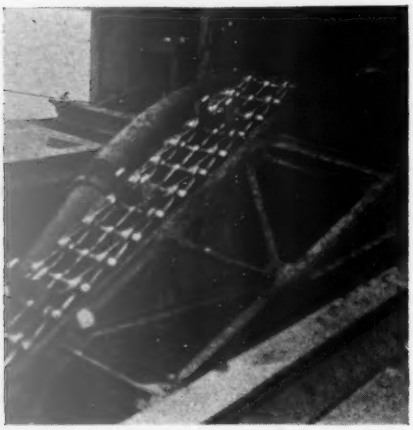
• A general view of the gravel screening, crushing and washing plant of the Concrete Materials Company at West Des Moines, Ia. The main storage bins and stock piles are in the background. The belt conveyor at the right handles processed sand from the field plant.

The plant properties include a 300 acre site with the 200 acre deposit bordering the north bank of the Raccoon River. The approximate 15 feet of overburden is removed by means of a Caterpillar D7 bulldozer and a LeTourneau scraper. The overburden is used in the building of a levee along the river bank. This levee was deemed necessary if the field plant was to remain dry and operating during the frequent flood stages of the river. Former high water periods have left several pools of water about the property which the company has advantageously employed as a source of washing water. Rain and overflow from the river replenish this supply of water from time to time. A deep well, equipped with an electrically driven centrifugal pump, maintains an adequate supply of wash water. The pump is located near the gravel processing plant.

The high water table in the deposit makes it necessary to employ a floating dredge in the recovery process. The deposit, extending about 30 feet below the water line, runs about 20 percent gravel and 80 percent sand with occasional pockets of clay, coal, and river bottom debris. To eliminate this foreign material from the finished products, washing is carried out at each screening stage

• Left: A view of the main storage bins, showing the mixing belt beneath. Above the bins (center) is a two-deck vibrating screen and a single tub washer. One of the belt conveyors (right) handles processed sand; the other, gravel.
• Right: The 30-foot log washer, viewed from above.



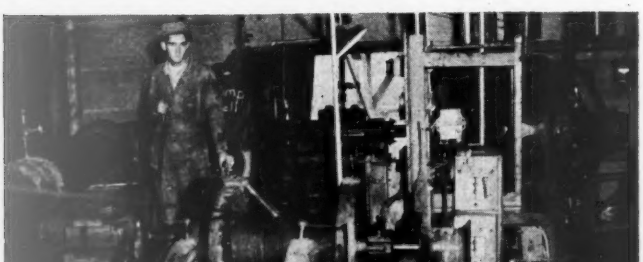


• Above, left: A view of the hydraulic dredge showing the cutter, whose head is working at a depth of about 28 feet.

• Above, right: A pontoon built especially for inserting additional lengths of 16-inch pipe.

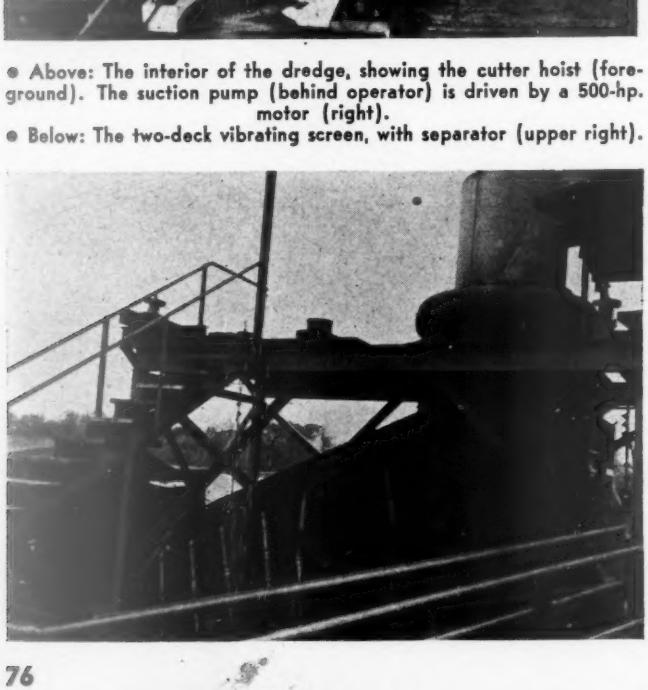
• Left: Screen-nozzle type ladder scalps over size as it digs.

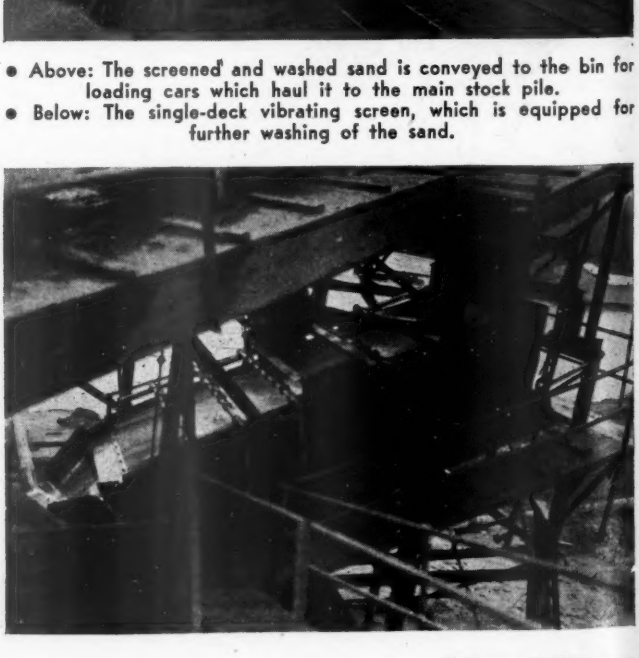
• Right: The two double screw units, from which the sand is discharged to the first of two belt conveyors.



• Above: The interior of the dredge, showing the cutter hoist (foreground). The suction pump (behind operator) is driven by a 500-hp. motor (right).
• Below: The two-deck vibrating screen, with separator (upper right).

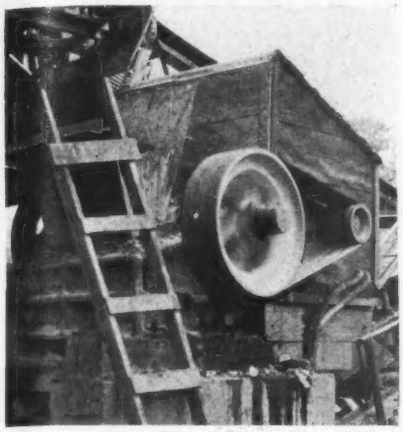
• Above: The screened and washed sand is conveyed to the bin for loading cars which haul it to the main stock pile.
• Below: The single-deck vibrating screen, which is equipped for further washing of the sand.





in addition to visual inspection of gravel as it leaves the scalping plant.

The dredge, floating on 6 pontoons supplied by the Dubuque



• Plus 1½-inch gravel is fed to a jaw crusher working in closed circuit with the screen.

Boiler Works, consists of a 45-ft. Diamond screen-nozzle type of ladder controlled by an American Hoist & Derrick Co. hoist, and a Diamond 15-in. centrifugal suction pump working into a 33-ft. head. Electricity is piped out to the dredge to drive the 500-hp., 2,300-volt Allis-Chalmers motor which operates the dredge pump and ladder hoist. With this recovery arrangement, about 350 tons of material per hour is forced through 600 feet of 16-in. pipe to the scalping stage of the field plant.

To overcome the difficulties encountered when adding lengths of 16-in. pipe between plant and dredge, the company had a special pontoon float designed which permits this work to be done with a minimum of effort and loss of production time. In the center of this float is mounted an I-beam which is the same length as the float, approximately 30 feet. Two clamps, which will handle 16-in. pipe, are secured to this beam in such a way that they can slide back and forth on the top of the beam. When a joint in the pipe line is to be opened, these clamps are fastened on each side of the joint and the dredge is then pulled forward enough to insert a new length of pipe in the opened joint. This method keeps the separated pipes in alignment while installing the new section. An overhead beam and endless chain-pulley are used in handling replacement of the dredge pump castings. When the new section has been secured, the clamps are released and the float is then ready to be moved to the next joint when another section is to be added.

As the material enters the field scalping plant, a Holloway trash-separator by-passes the foreign materials, along with about one-third of water volume and some sand, to a settling box chute equipped with a section of flat gravity ¼-inch screen cloth to recover the fine sand lost in the trash-separator. This recovered sand is then dewatered by a single screw unit. The sand from this screw then is blended by belt conveyor with that from later Eagle screw classifier - dehydrators. The chute carrying waste sand, water and impurities retained on the flat screen is equipped with grizzly bars which scalp off the trash, which is then chuted into the pit. The sand and water goes to an 8- by 8- by 24-ft. waste sand sump from which the sand is pumped by a 10-inch Allen-Sherman-Hoff pump to the waste sand pile at the edge of the pit.

That which is not by-passed by the trash-separator goes to a 5- by 14-ft. 2-deck Simplicity vibrating screen which is equipped with spray nozzles. A short belt conveyor receives the oversize, plus ⅝-in., from the top deck and transfers it to a 120-ft. belt conveyor which feeds a 75-ton storage bin. As the oversize leaves the screen, it is inspected and impurities, not removed by the trash-separator, are rejected by the inspector. The oversize is classed as

• The two-deck vibrating screen (background) feeds two stepped-steel chutes (foreground).

gravel and is transferred from the bin by company-owned cars to the gravel plant to be crushed, washed, screened and graded.

The sand passing the ⅝-in. mesh top deck but not passing the 3/16-in. bottom deck, flows into a double screw 22-ft. Eagle classifier-dehydrator which discharges onto the first of two belt conveyors handling sand from this plant. The fines passing the bottom deck flow into a second double screw 22-ft. Eagle classifier-dehydrator also emptying onto the first belt conveyor as does the single screw washer from the settling box chute. With this arrangement and control of flow through each of the 3 screw type units, three gradations of sand may be obtained or a mixture of the 3 in any specified proportion.

This first belt conveyor, which is 75 feet in length, carries the graded or mixed sand to a 5- by 12-ft. single deck (No. 6 mesh) Simplicity vibrating screen which is also equipped for further washing of the sand. The two gradations from this screen drop into individual double screw Eagle 22-ft. classifier-dehydrators which connect with the second belt conveyor of 10 foot length which completes the path of the sand to 75-ton overhead storage bin. A two-way chute over the bin permits loading of the bin or stockpiling beyond the bin. Here again the company's 6 bottom dump, 35 ton capacity cars are called into service for transporting the finished sand to the main storage bin and stockpiles adjacent to the gravel plant.

Two Plymouth locomotives with gasoline engines and one Davenport steam locomotive are used in hauling and spotting the cars on the approximate 2 miles of track employed in the plant and inter-plant hauling system.

The cars of sand are brought from the field plant to the gravel plant and emptied into a track hopper. From here a 175 ft. belt conveyor system carries the sand up about 65 ft. to one of the five 75 ton bins supplied by the Des Moines Steel Co. This conveyor system is made up of two separate belt conveyors with a transfer point so that the sand can be stockpiled on the ground below the conveyor as well as stored in the bin.

In a similar fashion, the raw gravel is brought from the field plant and deposited in a track hopper where it enters the process of screening, washing, crushing and sizing. An apron feeder handles the unprocessed gravel from the track hopper to a belt conveyor which feeds a 4- by 10-ft. 2-deck Tyler Ty-Rock vibrating screen equipped with spray nozzles. The oversize from the top deck, 1½-in. and up, is by-passed to a Model 936 Iowa jaw crusher working in a closed circuit with the screen. The plus ½ and minus 1½ are passed to a 30-ft. Eagle log washer and then to 4- by 8-ft. single deck Simplicity vibrating screen with ⅛-in. cloth for rinsing. This screen

(*Continued on page* 83)

Asbestos from Flintkote's New Mine Milled at Modern Canadian Plant

another ON THE SPOT report

FLINTKOTE Mines, Limited, located at Thetford Mines, Quebec Province, Can., is the first mining venture of the American-owned Flintkote Company, manufacturers of building materials, industrial products for maintenance and new construction and paperboard products. The totally-owned Canadian subsidiary has been in production since June of this year, mining and milling raw asbestos to supply the needs of the parent company. With the United States largely dependent upon Canada for high-grade asbestos fibers, the new mining and milling capacity in the Quebec mines will in a small measure ease the export demands on the older concerns in the district.

The new mine and mill are situated four miles northeast of the city of Thetford Mines, which is in the eastern townships of the Province of Quebec, some 150 miles east of Montreal. Approximately 60 percent of the world's supply of asbestos fibers is mined in this relatively small area.

The ore body at the Flintkote property is the usual serpentine rock interlaced with a network of asbestos veinlets. Drillings and blasting are done with conventional equipment, with particular attention to measures designed for the safety of the operators. Broken ore removal is also accomplished by conventional equipment including bulldozer, power shovels, and trucks.

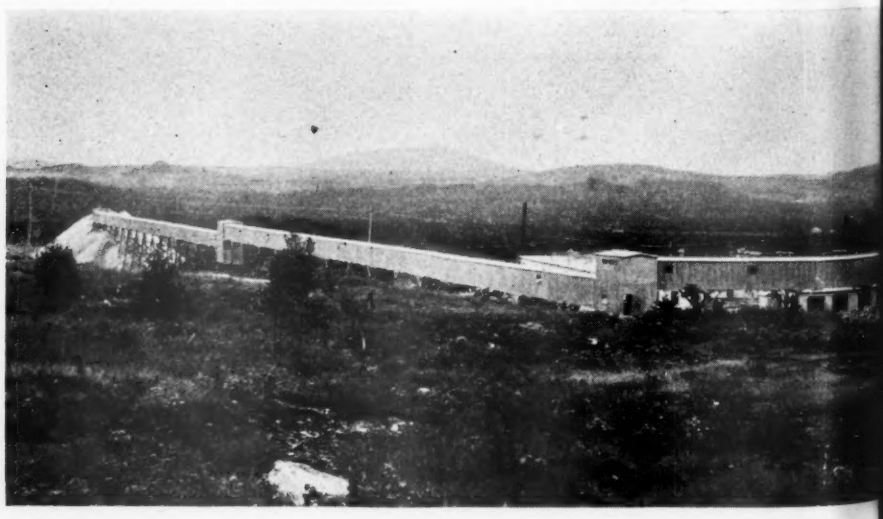
• Loading one of the 6-cu.-yd. trucks at the pit of Flintkote Mines, Ltd., Thetford Mines, P.Q., Canada. Power for the 2-cu.-yd. shovel comes from a 150-kw. motor-generator set housed in a nearby service building.

The mill is so situated that the average haul of ore from the pit is not in excess of 1,000 feet. After being dumped to a receiving bin, the ore proceeds through the usual crushing and sizing equipment and is dried in a rotary dryer arrangement equipped with a mechanical stoker. From the drying operation the ore can be conveyed directly through the mill to a conical ore storage bin.

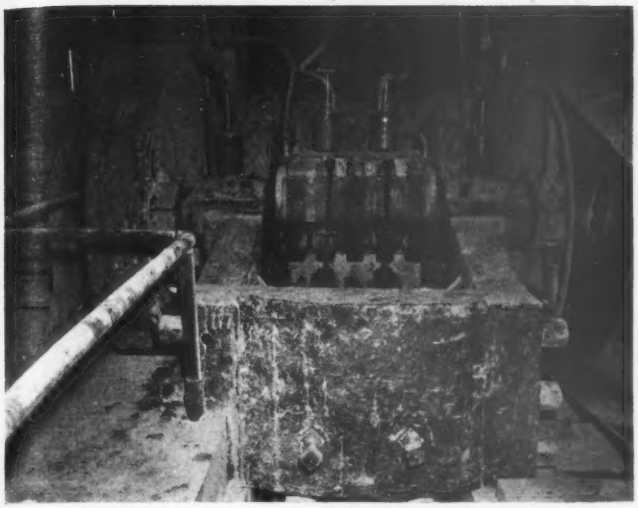
All ore conveyed to the mill is automatically weighed, and within the mill proper the ore is progressively broken down in order to release the asbestos fiber. In asbestos operations it is essential that the process be such as to minimize the breakage and shortening of the fiber itself.

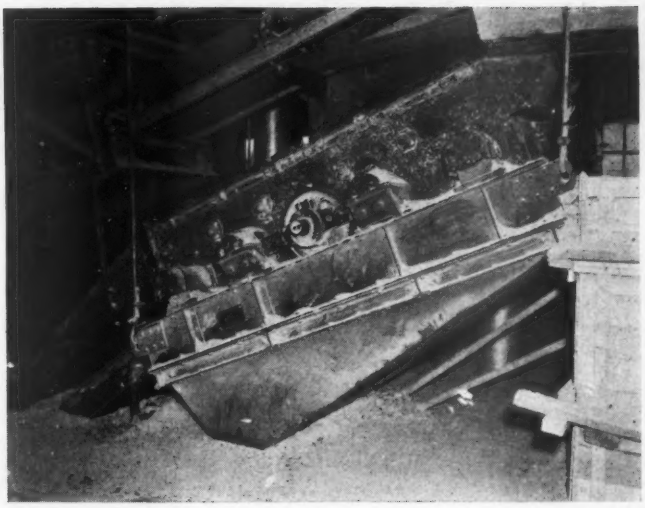
The conventional pneumatic suction method of separation of fiber from the rock is employed. The various grades of fiber are classified

• A considerable amount of valuable No. 1 fiber (¾-inch long) is recovered by hand. Note the clearly defined asbestos vein in the rock at the right. Such fibers lose value if they are crushed and milled.



• Right: This panoramic view of the new Flintkote Mines plant suggests the scale of the operations. The 12,500-ton dry ore bin is at the extreme right. The long enclosed conveyor on the left carries the tailings about 1,000 feet to the waste pile.





• Above, left: A view of the 30- by 42-in. primary jaw crusher. Only plus 3-inch ore is crushed at this stage.
• Above, right: One of the vibrating screens used in the cleaning operations.

by the use of screens and the waste rock or "tailings" travel from the mill over a long belt conveyor to a waste dump. Throughout the Flintkote plant only the most modern electrically-powered equipment has been installed, with most of the machinery push-button controlled. Considerable power is used, and power factor control is accomplished through use of synchronous motors.

The plant is completely protected by an automatic sprinkler system which includes a heated elevated water storage tank and a dam above the property which impounds water for the sprinkler system as well as for general use.

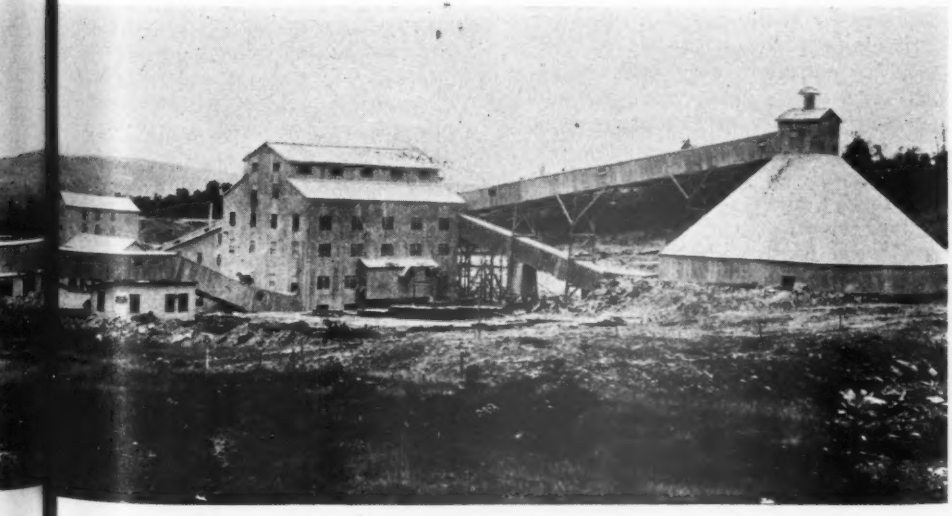
As a practical exercise in good neighborliness, The Flintkote Company has manned and staffed the plant entirely with Canadians. One consequence of employing only local citizens is that a considerable majority of the employees speak only French, which is by all odds the dominant tongue throughout the Province of Quebec.

• The asbestos fibers are graded in special enclosed trommels. Only crude fiber is milled. No. 1 and No. 2 grades, recovered ahead of the mill, sell at a premium.

Gordon H. Gibbs is manager of Flintkote Mines and R. S. Coleman is mine superintendent and assistant manager. The construction of the new plant was accomplished in eleven months.

Flintkote's development at Thetford Mines is but one phase of a current $16,000,000 plant expansion and modernization program. The company now has under construction a $1,250,000 laboratory which will occupy a 55-acre tract

(*Continued on page* 80)



• Dry ore is further reduced in this gyratory crusher.

MEN OF THE INDUSTRY—GEORGE EARLE NEW BRITISH ASSOCIATED CEMENT CHIEF

Descendant of Noted Industrialists Succeeds Sir Malcolm Stewart

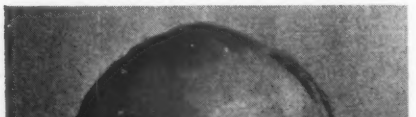
THERE is a new chairman of the Associated Portland Cement Manufacturers Ltd., of London. His name is George Earle and he has taken the place of that very well known figure in the English building trade, Sir Malcolm Stewart, who has been chairman of the company for 21 years and is now over 70 years old, although still retaining his youthful vigour and enthusiasm. Sir Malcolm on his resignation from the chairmanship of the company has been elected president.

The Associated Portland Cement Manufacturers Ltd., is one of the great English companies founded in 1900 by the amalgamation of many cement-making firms. It now, with its subsidiary companies of which much the largest is the British Portland Cement Manufacturers Ltd., has in England alone a capacity of six million tons a year, and in addition makes large quantities of lime, whiting and decorative building materials. It is really an international concern, for it has large cement-making interests in India, South Africa, Canada and Mexico, and there are other countries where, but for the war, the proposed works would already be in production. Although the A.P.C.M. Group is not, of course, of the same magnitude as the I.C.I. and the Lever Group it is apart from these enormous organizations one of the most important industrial companies in England.

There has been a lot of talk as to the production per man hour as compared with the U.S.A. figures. The British cement industry compares favourably with the U.S. cement industry. The British figure is 7 percent below the American, and they will not be satisfied until they have caught up and passed their cousins. As the A.P.C.M. control well over half the British cement industry they must be given much credit for this.

There is great enthusiasm in the A.P.C.M. for increased efficiency and the application of research work.

George Earle is a managing director of the A.P.C.M. as well as chairman. The only other managing director is G. H. E. Vivian. So now that Sir Malcolm Stewart has retired as a managing director these two are the main executives, although they have a very strong team



George Earle

of whole-time directors to help them.

This then is the company or group of companies of which George Earle is chairman. He comes from a family of cement makers. His great grandfather and his great grand-uncle founded the business of George and Thomas Earle of Hull in 1807. That was before portland cement was invented. They dealt in Roman cement and had a merchanting business with Russia. Mr. Earle's grandfather was the next head of the business, and he was followed by Hudson Earle, George Earle's father. Hudson Earle did much to improve the quality of cement made in England by setting a very high standard for those days, and the old motto of the still existing business of G. & T. Earle Ltd. (which since 1912 has been part of the British Portland Cement Mfrs. Ltd.) is still "Quality before cost".

George Earle has carried on this enthusiasm for high quality, which is bred in his bones and has certainly come out in the flesh. He started work at Hull with G. & T. Earle in 1910 when he was twenty, after being educated at Harrow and Cambridge, and by the time the first world war started had been appointed secretary, and six months before the war was made a director and put in charge of the business. At the age of twenty-four this was quite a responsibility. This appointment was made by the B. P. C. M. managing directors. His own experience is no doubt the cause of another of his enthusiasms — that of giving responsibility to young men. Much of the 1914-18 war he spent in Mesopotamia, serving in the 13th Hussars, and after the war returned to Hull. In 1923 he was made a director of the British Portland Cement Mfrs. Ltd., and in 1931 a director of the Associated Portland Cement Mfrs. In 1937 he was made a managing director of the A.P.C.M. and B.P.C.M., and since then apart from his work as chairman of G. & T. Earle he has spent all his working time with the A.P.C.M.

Apart from work his chief great pleasures are horses and fox hunting, and he spends what time he can in Leicestershire—that Mecca of fox hunters. His wife is a fine horsewoman, so they share these pleasures. Any other leisure is spent fishing, shooting and playing golf. His handicap is 7. His houses are Baggrave Hall, Leicestershire, and 33a, Shepherd Market, London, and his Clubs are White's and Buck's.

He has only been to the U.S.A. once, but hopes before long to pay another visit, having most pleasant memories of American kindness and hospitality.

Flintkote's New Mine

(*From page* 79)

near Morristown, N. J. A feature of the laboratory will be a wind tunnel in which full-size roof and wall sections may be studied at wind velocities up to 70 miles per hour. A 20,000-sq.-ft.-exposure farm will also be established for the study of temperature and weather effects on various building materials.

Flintkote has recently completed additional plants for the manufacture of asphalt tile at Los Angeles, Calif., Morristown, N. J., and Toronto, Canada, and has a plant nearing completion at New Orleans.

Portable aggregate plants are here to stay. If you are interested, the Pit and Quarry Handbook will tell you all about them.

Symposium on Lightweight Aggregates Highlights So. Calif. A.I.M.E. Meeting

another ON THE SPOT report

FOLLOWING a pattern set two years ago, the Southern California section of the Industrial Minerals Division of the American Institute of Mining and Metallurgical Engineers held its 1946 fall meeting in conjunction with the Petroleum Division. Sessions were held at the Ambassador Hotel in Los Angeles on October 25.

By HARRY F. UTLEY

Lightweight Aggregates Of the nine technical papers presented covering industrial minerals, the most extensive in scope and of peculiar interest to PIT AND QUARRY readers was the "Symposium on Lightweight Aggregates" by Stuart H. Ingram. Mr. Ingram covered his subject in a most thorough manner and with particular emphasis on the utilization and production of various lightweights in the southern California area.

In Los Angeles, because of the tremendous volume of concrete aggregates used, sand and gravel can be sold for as little as $1.50 per yard delivered on the job. While lightweight aggregates are being sold locally at prices per ton of more than four times that amount and upward, still the disadvantages of smaller tonnages handled, more processing and higher delivery costs allow no room for extravagance, the speaker pointed out. He predicted that production of any lightweight aggregate must be done on a scale large enough to justify much investment in plants designed for highest efficiency. The farther away from Los Angeles the raw material is located, the greater will be the necessity for high efficiency and economy.

Inorganic materials in general use fall into three general classes, (1) products of acidic magmas, (2) products developed from clays and shales and (3) by-products from other industries. In the first group are pumice, pumicite, volcanic ash, and the newest—perlite. The second contains various sedimentary materials in which porosity is developed by calcination. In the third group are the cinders and slag products.

The bulk of the lightweight material being furnished the Los Angeles area today is pumice. More than 30,000 tons have been mined this year, and the author predicted that in 1947 this amount will be increased to at least 100,000 and possibly 150,000 tons and will continue to increase from year to year.

In pumice, the vaporization of contained water has blown up the mass without being expelled from it. Thus it requires little further processing and most deposits answer well the qualifications for lightweight aggregates. When dry and sized, it weighs from 25 to 40 pounds per cubic foot and is hard enough to withstand the abrasion of handling and mixing without too much breakdown. Composed of stable silicates, it is chemically almost inert and is not affected by the usual forces of deterioration and decay. Along the Mono Valley, from Little Lake to well north of Bishop, are large deposits of water-laid pumice, many of which have fine porosity and are naturally so well graded by the mechanics of water deposition that by mixing the products from two or more pits any desired size range can be obtained with little loss. Most of these deposits lie within a few miles of the railroad, are covered with only a thin layer of overburden and are large enough to be mined with shovel or dragline. Most of the pumice used for lightweight aggregates in the Los Angeles area for the past 15 years has come from these deposits.

Perlite, the newest of the lightweights in the acidic magma series, presents somewhat of a conundrum, the speaker declared. None is available on the Los Angeles market, except in small quantities and at prohibitive prices. A good-sized plant is producing it in Phoenix, Ariz. At least one small plant is under construction in Los Angeles. So many claims have been made for the rather astonishing properties of this material that at any time it may make a determined bid for a high place in the lightweight aggregates field. The raw material, when subjected to heat, expands tremendously. Some of it weighs as little as one pound per cubic foot! There is no questioning its value as an insulating material in competition with mineral wool, vermiculite, etc., but becaue of its friability, its usefulness as an aggregate remains to be seen. Some disadvantages of perlite for lightweight aggregate are the comparatively small size of the particles so far produced and the difficulty of compacting a cement-perlite mix without segregation, due to the large difference in specific gravity between the aggregate and the cement mortar. For the most part, its use as a construction material has been limited to acoustical plaster, some small production of concrete blocks and as an aggregate in mixes designed for ceilings, floor fill and fireproofing.

Among the clays and shales, many lightweight aggregates have been produced by processes involving heat treatment. Some processes crush before firing, others fire to a clinker and then crush and size. Some even use a combination of both. When size graded, such material weighs 40 to 50 pounds per cubic foot. One of them, Gravelite, was used in decking the San Francisco-Oakland Bay Bridge; another, Haydite, is produced in widely separated plants throughout the country, the only California one being at San Rafael (See PIT AND QUARRY, June, 1945, p. 60.) Two others are Airox, made at Casmalia; and Rocklite from Ventura.

The one produced closest to Los Angeles is Rocklite. The shale used is fine, compact and uniform and the deposit is extensive. The raw shale is crushed, screened and fired at about 2,000 deg. F. in a rotary kiln. Production capacity is about 100 tons per day.

Diatomite and diatomaceous shales and earths also fall into this class. The Airox plant (PIT AND QUARRY, Feb., 1945, p. 107) is presently idle. The Johns-Manville Company has worked diatomite deposits near Lompoc, Calif., for many years, but the product is being used for insulation and filtering material and, so far as can be learned, Johns-Manville has made no attempt to market the output as a lightweight aggregate.

The entire output of Rocklite and Airox was used during the war at National City, Calif., in the production of concrete ships and barges.

The use of waste or by-products of other industries is basically determined by the size and permanence of the parent industry. Most common are cinders and expanded blast-

furnace slags, neither of which is available in southern California. In the East, of course, these offer the bulk of the lightweight aggregates, and such trade-names for the slag products as Waylite, Superock, Celocrete, etc., are unknown commercially on the West Coast. Slag is, however, produced in quantity at the Kaiser steel plant at Fontana, Calif., and a plant for its conversion into lightweight aggregate is apparently justified. Several interests, as well as Henry J. Kaiser himself, have long considered this possibility, but so far there has been no development. The proximity of Fontana to Los Angeles, however, is believed to foster such a project and, in the speaker's opinion, it will not be many years before Fontana will supply a major share of the area's lightweight aggregate resources.

The symposium cited some of the important structures in southern California in which lightweight aggregates have been used in recent months. One of these was the new plant of the Clayton Manufacturing Company at Rosemead in Los Angeles County. Pumice concrete was used in all concrete above the ground floor line. The pumice, furnished by Paul Splane of Van Nuys and sold under the trade-name of "Lite-Agg", came from two water-laid deposits in Inyo County. Although the pumice concrete cost $20,000 more than would have been the case had ordinary concrete been used, its light weight eliminated the use of $39,000 worth of steel, a saving of $19,000.

A slightly different angle is shown in the recent addition to the West Coast mail-order headquarters building of Sears, Roebuck & Co. in Los Angeles, where Rocklite was used. The original building was erected in 1929 and was engineered for three additional floors. In that year, the Los Angeles building code made no provision for resistance to earthquakes, but since the disastrous 'quake of 1933 the code has been amended thrice, each time increasing the requirements for lateral strength. Recently, when Sears, Roebuck needed more space, it was found that, through changes in the code, the original building could take no more lateral stress. But lightweight aggregates rescued the project, saving enough weight to allow the three floors to be added. In this case, it was not a balancing of costs; lightweight concrete was the only thing that would serve.

Heavy-Media Separation "Beneficiation of Industrial Minerals by Heavy-Media Separation" was described in a paper authored by G. B. Walker and C. F. Allen of the American Cyanimid Co. Cited were some of the many successful applications of the process in the treatment of industrial minerals. At Chewelah, Wash., the Northwest Magnesite Company is beneficiating approximately 150 tons per hour of magnesite mixed with dolomite, shale and quartz. The quarry product is crushed to minus 1½ inches, and the minus 3/16-inch portion is remined. The 3/16- to 1½-inch rock is fed to a 20-foot-diameter air-lift cone. The specific gravity of the separation medium is varied between 2.80 and 3.00, depending on the grade of magnesite desired.

About 40 tons of fluorspar ore is being treated hourly by the heavy-media separation method at the plant of the Rosiclare Lead & Fluorspar Mining Co. in Illinois. The flexibility of the heavy-media method provides an accuracy of control over the product grade that was never obtained with the jigs previously used. In addition, a substantial tonnage of metallurgical-grade spar has been recovered by retreatment of the old jig tailings. Operating costs have been reduced, recovery increased and close product control made possible.

Mention was made of an unusual industrial mineral beneficiation problem in the recovery of garnet from hornblende at the Barton Mines Corp. property at North Creek, N. Y. Approximately 40 tons per hour of minus 1¼- to plus ⅛-inch quarry product is treated at a specific gravity of 3.17. Heavy-media separation also replaced jigs at this operation, with a reduction in cost and an improvement in recovery.

An un-named producer of railroad ballast is reported to have shown considerable interest in heavy-media separation because laboratory tests have demonstrated the ability of the process to eliminate a low-specific-gravity rock from his quarry output. According to the speaker, the use of full face mining, followed by heavy-media separation, will offer cost reduction, accurate product control and greatly extended quarry life to this producer.

Gypsum, bauxite, and potash have all responded favorably to treatment, both in this country and abroad, the paper pointed out, and additional plants for the treatment of magnesite and fluorspar are now under construction.

Western Fluorspar Rather closely tied in with the preceding paper was one entitled "Fluorspar in the West", by Roy L. Cornell, vice-president, California Testing Laboratories. Speaking of flotation treatment of spar, he said: "Those of us who have to do with the operation of flotation mills know that, to our embarrassment, there are periods when it seems quite impossible to produce a concentrate of the usual grade and face penalties on our shipments. When the fluorspar flotation operator finds himself with a binful of concentrate which will not meet usual specifications, he is able, by pelletizing, to produce a desirable grade of spar. He will probably realize as much or more net profit by selling at the lower price obtaining for metallurgical grade than he would by attempting to reclean the lot."

Mr. Cornell was optimistic on the outlook for a growing western fluorspar industry. Depletion of Illinois and Kentucky reserves will attract development of western deposits in the future, and he declared that several important eastern operators have only recently acquired properties in Colorado and New Mexico merely to safeguard their own future needs.

Bentonite The prospecting, developing and mining of bentonite deposits were told by John Patrick Rasor of the Filtrol Corporation of Los Angeles.

Most commercial bentonite deposits occur in flat-lying sedimentary beds, said the speaker. Typical examples are the bentonite beds associated with sediments along the Gulf Coast and other commercial deposits lying in the South, from western Alabama to the Rio Grande. Other reserves being worked are found in eastern Arizona and southwestern California, Strip-mining methods predominate, and the speaker outlined the field work and drilling methods his company has followed in prospecting some of the deposits.

Selection of proper equipment for actual mining varies with the character of the deposit. Draglines have been most useful both for stripping and excavating the material. Where the bentonite occurs in beds of uniform thickness and the contact with the overburden is sharp, power shovels have proved to be most feasible.

The dragline method, making 50-foot cuts, has been largely employed because of the character of the deposits. A ¾- to 1-cubic-yard bucket handled by a 30- to 35-foot boom has been entirely satisfactory. When soft bentonite is encountered and particularly where the bed is pitted, a smooth-lip bucket is preferable, declared Mr. Rasor, as it affords better mechanical cleaning and re-

duces the amount of hard labor necessary to mine the bentonite without contamination.

Barite In a review of barite production and outlook in the United States, A. C. Harding, general superintendent, Baroid Sales Division, National Lead Co., dwelt at length on California's part in helping supply the barite needs of commerce and industry. Most of California's production comes from a property at El Portal in Mariposa County. This deposit, largest west of the Rockies was also once noted as the only commercial witherite deposit in the entire country, although the witherite has now been exhausted and the barite is being worked from both sides of the Merced River Canyon. The mill is on the north side of the river and material from the south side is conveyed to the plant by a 3,000-foot semi-automatic double rope tramway carrying buckets of ½-ton capacity. After crushing and preliminary jigging, grinding is accomplished by an 8-foot by 36-inch Hardinge mill in circuit with a bowl classifier. The ball mill is used as a "gravity concentrator", the density of the mill charge being maintained at 3.4 so that the lighter waste floats in the pulp and is discharged unground. The barite, being softer and heavier, is then readily ground. Plant experience has indicated that a better concentration can be effected by this selective grinding than with jigs and tables. The ground barite is dewatered in a 30-foot thickener and dried before being packed in paper bags.

In Los Angeles another producer is operating a dry grinding plant using ore shipped in from Nevada. In this plant the barite is crushed, then ground to 95 percent minus 325 mesh in a Raymond four-roller high-side mill. A similar method is reported to be in use in a dry-grinding plant at Berkeley, Calif.

Glass Industry "Raw Materials Used in the Glass Industry on the Pacific Coast" was the subject of a paper by C. A. Chaffee, chemical engineer with the Latchford-Marble Glass Co.

The glass industry on the West Coast is devoted almost entirely to the manufacture of glass containers, eight modern bottle plants being in operation, with at least three additional factories under construction.

Silica sand, the chief raw material, comes from Nevada and from Corona and Del Monte on the Monterey peninsula in California.

The purest sand is that shipped in from Nevada where the Fe_2O_3 content is under 0.05 percent. The Corona deposit is a secondary deposit of decomposed granite. The Fe_2O_3 content is about 0.10 percent, too high to be suitable for colorless glass. The owners of the Corona plant, Mr. Chaffee reported, are planning a modern processing plant for the near future and expect to refine the sand so that its iron content will be much lower. The Del Monte sand is extracted from dune deposits and has a reported iron content of about 0.05 percent. (See PIT AND QUARRY, Sept., 1946, p. 103.)

How soda ash is produced from one of the largest of these dry lakes was described in another paper, "Owens Lake—Source of Sodium Minerals", by George D. Dub. Formerly general manager of the Pacific Alkali Co., Mr. Dub has more recently been superintendent of the Pittsburgh Plate Glass Co.

The meeting closed with the annual banquet, held jointly with the Petroleum Division in the Embassy Room at the Ambassador. Past President Harvey S. Mudd spoke on "Some Observations in Europe and Cyprus." A talk on foreign trade relations was also made by A.I.M.E. president Louis S. Cates, who heads the Phelps Dodge Corp.

Blast Furnace Slags

(*From page* 74)

square crystals. The color is pale chestnut brown to transparent. The specific gravity is in the neighborhood of 2.58. Figure 4 shows calcium sulphide in a polished section.

Calcium orthosilicate ($CaSiO_4$) crystallizes in the monoclinic (?) system and is developed in three phases; the alpha, beta, and gamma depending upon the temperature of formation. The specific gravity for the three phases ranges from 2.97 to 3.28. From all indications, calcium orthosilicate is formed in blast furnace slags containing a relatively high percentage of lime. Figure 5 shows the development of calcium orthosilicate crystals.

Periclase (MgO) crystallizes in the isometric system, and usually occurs in rounded grains. The index of refraction is about 1.74, with a specific gravity ranging between 3.67 and 3.90.

Olivine (Mg, Fe) T_2SiO_4 is one of the basic minerals found in slag. It crystallizes in the orthorhombic system, and is usually olive green, brownish green, or grayish red in color, becoming brown or red by oxidation. The index of refraction ranges from 1.63 to about 1.69. The specific gravity ranges from 3.27 to 3.37 increasing with the amount of iron present. Fig. 6 is a thin section of slag showing faintly developed olivine crystals.

Glass is sometimes present in blast furnace slags, and represents an end condition in which the molten material has failed to completely crystallize. In thin sections, this glass is usually brownish in color and of course under crossed nicols is entirely dark. See Fig. 2 for the general appearance of glass in thin sections.

(To be concluded)

Well-Designed Plant

(*From page* 77)

serves as a sieve for further washing of the gravel as it is returned to the main conveyor line handling gravel from the plant to the 4 storage bins adjacent to the sand bin.

A single belt conveyor moves the processed gravel to the final gradation stage atop the storage bins. A 4- by 12-ft. 2-deck Tyler Ty-Rock vibrating screen, equipped for further washing, completes the gradation process. The top deck of this screen is divided to pass ¾-inch and ⅝-inch gravel, and the second deck is divided to pass ½-inch and No. 4 sand. The No. 4 sand passes through a 12-ft. single screw Eagle re-washer before it reaches the storage bin. The ½ inch, ½ to ¾ inch and ¾ to 1½ inch are passed from the screen to their respective bins. For routing the ½ to ¾ inch from screen to bin, a stepped-type metal chute is used; this type of chute is intended to reduce wear on the metal surfaces. The ¾ to 1½ is carried by a similar chute to a short belt conveyor connecting with the bin for this size of gravel.

The five steel storage bins are arranged as a straight line bank with track facilities for loading cars. A 36-in. by 90-ft. mixing belt, located below the bin discharge gates, runs the full length of the bins. When a mixture of any number of the stored aggregates is wanted, the respective bin gates are opened to allow the material to drop onto the mixing belt in the desired proportions. To insure thorough mixing, a paddle-wheel device has been installed at the discharge end of the conveyor which mixes the materials as they fall into the cars below. The mixing belt is also used when just one size of material is to be loaded.

In cases of great demand for a particular aggregate mix, loaded cars of the particular mix are moved down the yard to the stockpile area

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Car Supply, Dust Problem Discussed At National Industrial Sand Meeting

another ON THE SPOT report

THE Annual Fall meeting of the National Industrial Sand Association was held October 24 and 25, 1946, at the Edgewater Beach Hotel, Chicago. It was well attended and the program was largely devoted to the discussion of problems of vital interest to the industry. The meetings were presided over by A. Y. Gregory, Whitehead Brothers Company, president; and Vincent P. Ahearn, executive secretary of the association. As at Hot Springs in May, one of the important subjects discussed was the dust problem and much attention was also given the newer problem of railroad car supply. Also discussed were incorporation of the association, revision of the Constitution and By-Laws, recent developments in collective bargaining matters, reviews of governmental regulations affecting industry, and so on. Mr. Ahearn, as usual, gave those in attendance a clear picture of present conditions and sound advice on future developments.

It was decided that the 12th Annual Meeting be held at The Homestead, Hot Springs, Va., May 14, 15 and 16, 1947. The Fall meeting in October, 1947, will be held at Lake Placid, N. Y., if the necessary arrangements can be made; otherwise it may go to the Grove Park Inn at Asheville, N. C.

In discussing the dust problems of the industry, which he covered so thoroughly at Hot Springs, Theodore F. Hatch, Industrial Hygiene Foundation, Pittsburgh, made it clear that the industry as a whole had made considerable progress in curtailing the dust problem. Every type of problem has been solved, but the necessary equipment is difficult to obtain.

Theodore C. Waters, association counsel, reported on the outcome of negotiations with the National Council on Compensation Insurance. According to Mr. Waters, the insurance companies balk at reducing insurance rates because they are afraid of a flood of claims in case of a business recession. The existing rates, he said are so high that many companies now refuse to carry such insurance. Unless indisputable data is made available by the industry to support claims for rate reductions, he warned, the present high rates may even be increased.

Mr. Waters also stated that the U. S. Public Health Service is preparing a Model Code of Industrial Hygiene to be distributed to state agencies for their comment and later use. No effort has as yet been made to get the industry's opinion. Several states, he said, may act on this subject soon and the industry will be represented when the decisions are made.

One of the most pressing problems now confronting the industry is the shortage of railroad cars and their poor condition. A poll of those present indicated that there is a severe general shortage, especially of box cars, and that it is getting worse. Conditions varied considerably in different areas, some getting only a small fraction of their needs and a few getting an ample supply. It was suggested that one way to improve conditions was to induce customers, especially foundries, to improve their sidings so larger cars could be used and to increase their sand storage capacity so that cars need not be held up for unloading and so that a sufficient supply could be stored to carry them through the heavy fall traffic season.

It was stated that the new cars being built by railroads will have capacities of 70 tons or more and producers are advised to prepare their sidings for them.

The condition of the cars available is also very poor on the average and many producers are being forced to repair them without being able to obtain reimbursement through the ICC. Some producers reported being able to obtain the necessary lumber for such repairs from the railroads and a few have been able to induce them to supply clean, repaired cars. It was suggested that after this period of car shortage is over a concentrated drive be made to see that all cars are received in usable condition. It also developed that it is standard practice in case of leakage in transit to use railroad shipping weight and to have the customer file a claim against the railroad for any such losses.

In discussing the appointment of a Foundry Sand Committee, Stanton Walker, consulting engineer for the association, said that the American Foundrymen's Association had a representative on the old committee and wants one on the new committee when it is formed. Discussion brought out the opinion that the association needs to have a hand in the formation of any new specifications or some may be adopted which it is impossible to meet. It was stated that if the producers prove to specification writers what cannot be done they will adjust their specifications accordingly. President Gregory appointed a committee which is to appoint its own chairman.

Mr. Walker also reported on the work of the committee on dust control in abrasive blasting. He said that the Industrial Hygiene Foundation had been authorized to prepare a manual on this subject which will be available soon.

Well-Designed Plant

(*From page* 83)

where a Link-Belt 1¼-cu. yd. clamshell and a P & H 1-cu. yd. clamshell are used in removing the material from the cars to the stockpile. With this arrangement, the consumer can obtain desired quantities at his convenience. Individual sizes of material are stockpiled in the same manner.

A commendable job of design and layout has been carried out in this plant which employs steel construction throughout, with concrete footings to support the equipment and bins. The company's operating personnel was used on the construction work. This plant is designed and set up for year-around operation and employs a 20-man crew on the day shift and a 14-man crew on the night shift when operating at maximum capacity. The machine shop, which includes an 18-ft. lathe, is adequate for carrying out the repair and construction work required by this operation.

Those responsible for the operation of this outstanding plant are: H. D. Bellamy, president, Cedar Rapids, Ia.; T. E. Rust and W. W. Roberts, vice-presidents, Waterloo, Ia.; F. E. Bellamy, sec.-treas., Cedar Rapids; Gene Mason, sales manager, Des Moines; and Howard Barnett, plant superintendent, West Des Moines.

Fifty Years of Liner Practice in Cement Grinding Mills

Part II

By JOSEPH M. WOLFE
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TO reduce the initial cost of grinding mill installations, chrome steel liners 2¼ inches thick instead of 3 inches (exclusive of the rib projection) have been developed as standard. Similarly, 1½-inch-thick liners have replaced 2½-inch liners in secondary wet grinding of cement raw materials. These changes conform to the trend that has been initiated by high-carbon-steel rolled plate liners. These are cut from special rolled plates and are held in place within mills by keeper bars, which are analogous to ribs on cast liners and will be described later in this article.

Chrome-alloy-steel liners, produced by casting and careful heat treatment, and used in primary grinding work, are designed as wave-type liners which have an integrally cast rib 1¾-inch high. The employment of shiplap or smooth liners in primary grinding is uncommon. The wave-type liner has been found well suited to provide the necessary lifting action for the balls which may range in size from 2 to 5 inches, depending on the circumstances. Experience has demonstrated that the shiplap liner, which may be used in rod mills for grinding hard ores or specification sand, provides a lifting effect that exceeds the requirements for grinding in the cement industry and wastes power by increasing the trajectory of the ball charge. On the other hand, the smooth liner does not raise the grinding media sufficiently for average materials and its use is confined to grinding soft limestones or chalky materials.

It should also be pointed out that the size feed to grinding mills has undergone considerable change during the past 15 years and that whereas 1½-inch feed was not unusual, modern practice crushes raw materials to minus ¾-inch and clinker to minus ½ or ¾-inch. This relatively-finer feed can be successfully comminuted to 20 mesh with smaller grinding media. This has also influenced a slight decrease in the thickness of cast, chrome-alloy steel liners.

Cast alloy-steel liners have been applied with good results to wet grinding raw materials. A modified ship lap effect has been incorporated into these liners in certain cases although any desired shape may be used.

The projecting or lifting rib on conventional liners is always parallel to the direction of flow of material through the mill; within the past few years a liner has been developed on which the projecting rib is arranged diagonallly across the face of each liner. As the mill rotates, "spirals" formed by the diagonal ribs on the liners, sweep the finely-ground portion of the pulp on toward the discharge end of the mill, thus tending to effect a rapid evacuation of the contents of the mill and inhibiting overgrinding. Those liners have been employed for several years in two wet raw grinding 9½- by 5½-foot wet-grinding preliminators operating in closed circuit with Utah electro-magnetic vibrating screens, and the operators report a marked increase in mill production over the parallel-ribbed liners.

Those two preliminators operate side by side and a direct comparison of capacity and fineness was readily available from tests when one of the mills was equipped with the diagonal-ribbed liner, while the conventional liner of equal quality and lifter height was retained in the other mill. The spiral liner has the rib set at 19 degrees from the direction of the longitudinal axis of the mill. The diagonal-ribbed design is illustrated by Fig. 6 which shows a plan and cross-section of a liner 28¼ inches long.

As a matter of interest another type of liner, which has been developed for grinding ores on the basis of studies of the shape and proportions of worn liners, is the wear-type liner. As shown in Fig. 7 this liner when new has the outline of a worn liner and an appreciable saving in the initial cost is achieved through the efficient distribution of metal in each element of the liner. Unlike conventional liners wear-type liners when new do not increase power input to the mill as the lifter rip is already suitably proportioned and does not undergo disproportionately high wear.

In the cement industry the relative grindabilities of massive limestones or shales to that of clinker do not ordinarily warrant liners of different shape for each grinding operation. Wave-type liners have been installed in raw and clinker mills in the same cement plant. It should be mentioned that when grinding such tough materials as oyster shells, where a very great impact energy is required, the shape of the liners for preliminary grinding may have to be taken into consideration and a liner with considerable lifting effect, in conjunct-

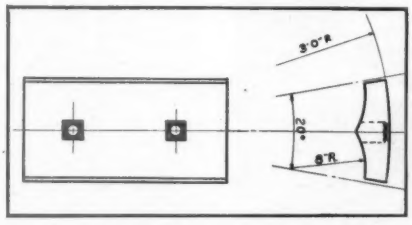
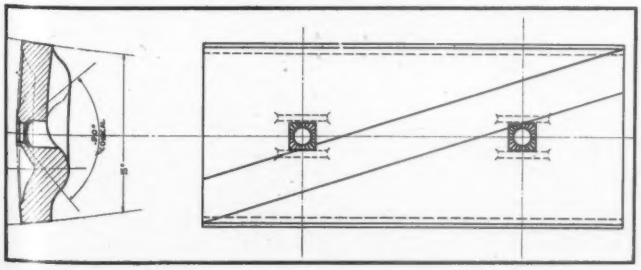
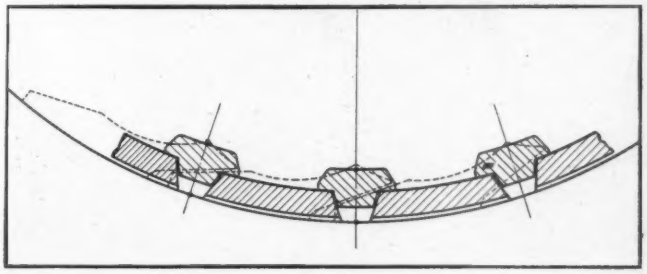


Fig. 7. Outline showing a new wave-wear-type liner that has been applied in the mining industry to decrease scrap loss of worn liners.

• Fig. 6. Liner of alloy steel designed with integrally cast ribs set diagonally across the face of the liner. This feature has increased mill capacity by approximately 10 percent.





• Fig. 8. Comparison of a wear-type liner of ship-lap design with a liner of the separate lifter bar type. The toe of the wear liner is super-imposed over the detachable lifter bar.

tion with balls of appropriate size, should be used. In this case, a shiplap liner of high-lifter type might be indicated.

Wherever cast liners are employed it is customary to pour zinc into all

• Fig. 9. Allis-Chalmers Lorain rolled high-carbon steel mill liners showing arrangement of beveled lifter bar with flat shell liners. Wedge-shaped portion of lifter bar clamps shell liners tightly against shell. Holding-down bolts pass through lifter bar as shown by the two holes. Lifter bars and plates may be cut to any desired dimensions to suit existing mills.

spaces resulting from slight casting inaccuracies. This is an economical practice designed to assist these alloy-steel linings to give longer years of service.

Zinc completely isolates the chamber formed by the liners from the inner surface of the plate-steel mill shell, thereby preventing leakage of pulp or slurry to the inner surface

• Fig. 10. Allis-Chalmers Lorain steel liners installed in a preliminator ball mill used for producing raw slurry in a wet process cement plant. Each lifter bar, when bolted down, wedges the shell plate firmly and prevents shifting of the mass of liners. In the mill shown the lifter bars are staggered to produce the same effect as the diagonally-ribbed wave-type liner.

of the shell. Such leakage might, through abrasion, cause dangerous wear and weaken the structural strength of the mill. Zinc further forms, through its continuous network which fills all interstices and with the liners with which it is bound, a single solid cylinder which absorbs the percussion of the cascading ball charge with reduced shock to the bearings and driving gear.

In some cases liners used in preliminary grinding chambers not bound together by some filling material may become loosened in a relatively short time and considerably prior to the time replacement becomes necessary owing to wear. Subsequent movement of the lining plates may in a comparatively short time result in rapid deterioration of the protective lining, loss of efficiency in grinding and consequent costly shutdowns. Milling departments would seem to justify installation practices on mill linings that will incur the least frequent interruptions in production.

The secondary dry grinding of raw materials and cement clinker does not require as rigorous duty from liners as secondary wet grinding and for the former purpose chilled cast-iron liners may be employed. For this purpose the spaces between liners are completely filled with pine wood filler bars.

The foregoing description is typical of cast-steel linings employed in grinding mills in cement plants, although custom and personal preference of those in charge may dictate variations in the shape of liners and in their chemical composition. It is generallly recognized by mill operators that high-quality chromium-steel alloys are equal to all other liner materials now commercially available, although high-carbon-steel plates are now assuming an important position in grinding work. Manganese steel liners are widely used in ball mills for wet grinding at ores, but their use for grinding mills in cement plants has neven been great.

The need to manufacture one or more types of cement in one grinding installation has redirected attention to separate primary-and secondary-grinding mills in order to obtain high flexibility of operations and controlled balance of output. This trend has been accompanied by

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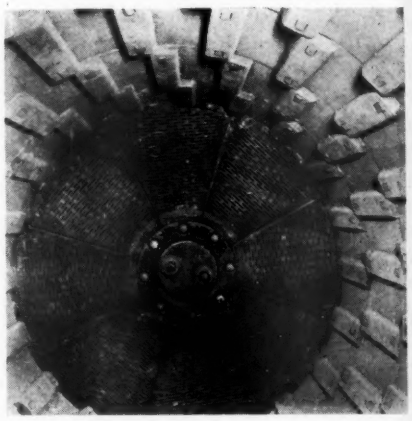
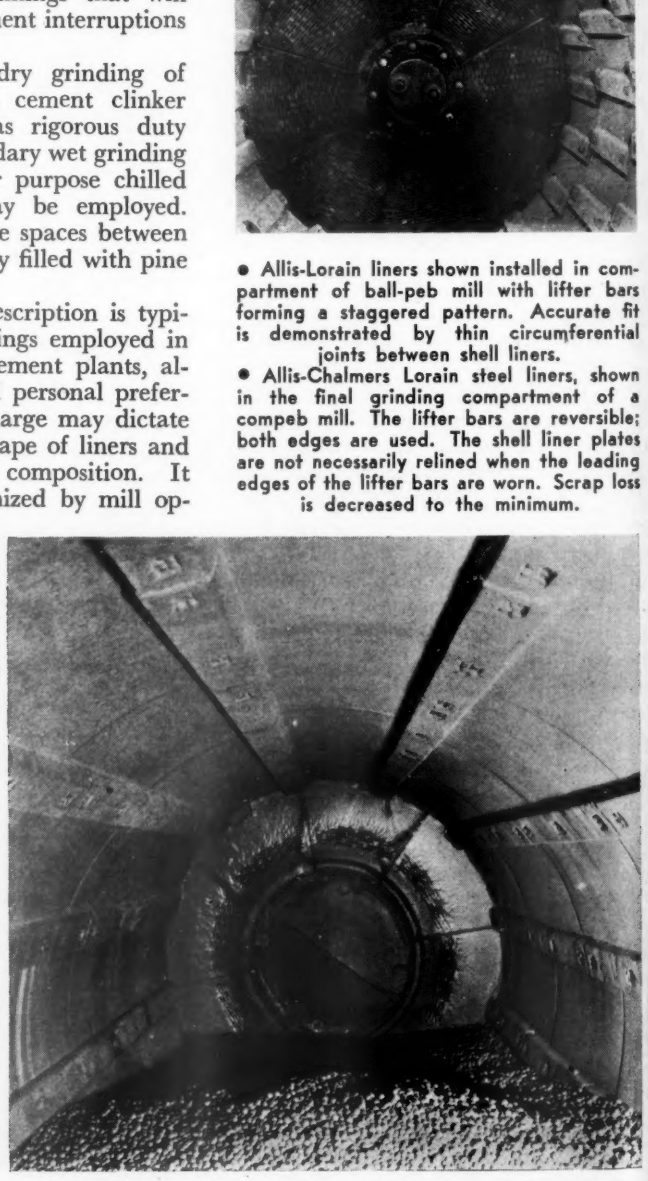


• Allis-Lorain liners shown installed in compartment of ball-peb mill with lifter bars forming a staggered pattern. Accurate fit is demonstrated by thin circumferential joints between shell liners.

• Allis-Chalmers Lorain steel liners, shown in the final grinding compartment of a compeb mill. The lifter bars are reversible; both edges are used. The shell liner plates are not necessarily relined when the leading edges of the lifter bars are worn. Scrap loss is decreased to the minimum.



Operating Division—Nat'l Lime Assn. Holds Second Meeting at Hershey, Pa.

another ON THE SPOT report

THE Operating Division of the National Lime Association held its second meeting at the Hotel Hershey, Hershey, Pa., November 5, 6 and 7, 1946. The attendance of over a hundred individuals, most of them operating men and officials of member companies, pronounced this one of the most valuable meetings ever held and it seems certain that these meetings will be among the most important future activities of the association. One official of a large lime manufacturing concern said that just one idea obtained at this meeting will mean an immediate saving of from $8,000 to $12,000 annually for his company and that at least three other ideas will save further thousands.

The program included four half-day sessions devoted to discussions of packaging, lime burning, quarrying and employee-management relations. Each session was crammed full of interesting discussion participated in wholeheartedly by most of those present, and each could have been extended far beyond the 3-hour time limit. Wallace E. Wing, chairman of the program committee, Russell Rarey, chairman of the arrangements committee, and the other members of these committees are to be congratulated for the success of this meeting.

Other features of this meeting included a field trip on Wednesday afternoon to several of the H. E. Millard lime plants, including the rotary-kiln plant at Annville which is one of the largest and most modern of its kind in existence. The group dinner Tuesday night was well attended and entertainment was provided by Fred Chambers and F. C. Mallery, National Gypsum Co., Luckey, O., who are well known in the finishing lime district of northeastern Ohio for their participation in amateur theatricals. Wednesday night all were guests of H. E. Millard at a shore dinner held at the Community Inn at Hershey.

Packaging The packaging session was presided over by F. C. Mallery, works manager of the Luckey plant of National Gypsum. He started proceedings with a brief history of the evolution of packaging methods up to the present. Burton A. Ford, St. Regis Paper Co., New York, described the palletizing of sacked lime during the war and said that further experimentation is being carried on which may make this method practicable in normal times. The chief problem, he said, is the returning of the pallets. Mr. Ford also commented on the trend toward standardization of bag sizes as an economy move and said that there is also a trend away from white and fancy bags and toward less but heavier plies. George Leopold of the same company told how to humidify bags which have become dry and brittle in storage. The simplest methods include the use of heated pans, sprinkling the floors, wet burlap curtains, etc. Producers were also advised to adjust the types of bags used to the conditions they would be subjected to, the distance shipped, etc. The largest possible tube size was recommended for maximum bagging capacity and the bag should be large enough to take the material readily. Best results, it was stated, are obtained with a 3-tube machine operating at 1200 r.p.m. and with standard valves.

The subject of handling filled bags aroused considerable discussion which made it evident that there is a definite trend toward the use of mechanical means of loading cars. At one plant a reversible shuttle belt conveyor is used at the packer and this feeds to a reversible portable belt conveyor in the car. The preparation of cars was another timely subject because of the general poor condition of the cars now available and the shortage of lining paper. One company staples together the wrappers in which the bags are received and lines the sides of cars with them; another uses lining only for long shipments, and another only for hydrate.

Car loading methods were also described which take advantage of the fact that bags have the most protection at their ends.

Lime Burning The lime burning session was presided over by Irving Warner, Warner Co., Philadelphia, who also led the discussion on lime burning problems. A group of 28 questions was presented to a selected

• A few snapshots taken at one of the Millard lime plants. Below, left: Irving Warner, Warner Co., Philadelphia; C. D. Williams, H. E. Millard, Annville, Pa.; Theron C. Tayler, Tayler Engineering Service, Detroit. Below, right: Carl Morris and Paul Sunderland, Ash Grove Lime & Portland Cement Co., Kansas City, Mo.; Russell Rarey, Marble Cliff Quarries Co., Columbus, O.

group of experts which included: C. C. Loomis, New England Lime Co., Adams, Mass.; Victor J. Azbe, Azbe Engineers, St. Louis; H. M. Beatty, The Kelley Island Lime & Transport Co., Cleveland; W. R. Cliffe, Lime Industry Management & Engineering, Hershey, Pa.; Bolton L. Corson, G. & W. H. Corson, Inc., Plymouth Meeting, Pa.; E. D. Williams, H. E. Millard, Annville, Pa.; J. H. Robinson, Gypsum, Lime & Alabastine, Canada, Ltd., Toronto.

This session opened with a discussion of "Preventive Maintenance" by B. Magee, National Gypsum Co., Kimballton, Va. Mr. Magee briefly reviewed the mechanical importance of proper inspection and maintenance but said that planning is even more important in avoiding costly shutdowns. He pointed out that in some cases it is a good investment to have duplicate equipment and also that a high safety factor in equipment is good economy. Idleness, he said, is damaging to equipment which will deteriorate almost as fast as when in use. Temperature changes and vibration are also harmful and the frequency of inspection and cleaning should be governed by such conditions.

A program of this kind, said Mr. Magee, should be laid out by someone familiar with all parts of an operation and a higher type of employee is advised for inspection than for maintenance. An effective prevention program should include periodic inspection by competent men, the keeping of complete record data, and the proper interpretation of such data, and the repairs must be made at the most advantageous time. Mr. Magee also emphasized the importance of installing adequate provisions for the health, safety and comfort of the employees.

Discussion of the operating questions at this session brought out the fact that although 6- to 12-inch stone is burned in most vertical kilns, 3- to 6-inch is advised but smaller sizes should only be used where accurate control of temperature is possible. Stone under 1½ inches in size was advised where possible for rotary kilns. One operator said that in starting up an induced draft vertical kiln fired with natural gas the heat should be increased gradually until the critical temperature has been passed, after which it can be safely shot up. The control of air leakage on such kilns is a real problem and 20 percent is considered excellent as most kilns are nearer 50 percent.

It was agreed by several that combustion changes in the kiln have no effect on the physical properties of the lime but that they do affect the impurities. The addition of secondary air for the burning of gases higher up in a kiln was said to be impractical for both vertical and rotary kilns. There was some disagreement of the comparative fuel efficiencies of various methods of firing but it seems that both stoker and producer gas firing have an edge on hand firing.

High sulphur coal was said to materially affect the plasticity of lime and absorption was lowest at low temperatures and highest with fine materials. It was also pointed out that this is a less serious problem in rotary kilns where the heating is done more by radiation than by direct contact.

There is apparently no set rule for the practical height of a shaft kiln compared to its diameter as the cross-sectional area governs capacity and the height depends on the stone size. The location of the burner pipe in a rotary kiln apparently has little effect on efficiency but the diameter of the pipe apparently should be varied to keep an air velocity of about 90 feet per second. Pipes in use are said to vary from 6 up to 14 inches in diameter.

The subject of kiln rings again received much attention. Most agreed that it is best to prevent or delay formation but that when formed rings are shot out more economically that dug out. Some producers are able to cut out a small key with about 100 shots and then sometimes only a few more shots are necessary to bring down the rest of it. The use of even 500 shells is said to be more economical than shutting down the kiln which cannot safely be cooled in less than 15 hours. Several other producers used water sprays which do the job in from 6 to 8 hours without damage to lining or kiln shells but create considerable dust.

Quarrying The quarrying session was presided over by Paul Sunderland, Ash Grove Lime & Portland Cement Co., Kansas City, Mo. He first described the use of a Jumbo drill in one of his company's mines for tunnel work.

Keith Waugh, works manager, National Gypsum Co., Bellefonte, Pa., gave an interesting description of the experience with diamond blast hole drills at the shrinkage stope mine operated there. A complete description of this appears in an article elsewhere in this issue written especially for PIT AND QUARRY by Mr. Waugh.

W. L. Wearly, Joy Manufacturing Co., Franklin, Pa., described and illustrated the use of the Joy loader in limestone mines. This machine was first developed for use in coal mines with low ceilings, was later adopted in gypsum, potash, salt, bauxite and other nonmetal mines, then in low-ceiling limestone mines. It proved to be so successful in these specialized applications that it was recently tried out in a high-ceilinged limestone mine in competition with standard crawler shovels. This test showed such good results that a special heavy-duty machine now being developed is said to have possibilities for use in open quarries. This machine can be used for loading trucks or cars but is said to be most efficient when used in connection with a Joy shuttle car, a low penumatic-tired machine of 7 to 14 ton capacity which has a conveyor bottom for discharge. A movie was shown of the two machines in operation in a coal mine. In answer to questions Mr. Wearly said that the cars have speeds of 6 m.p.h. empty and 4½ m.p.m. loaded and that they easily negotiate fairly steep grades.

The next speaker, Jules Jenkins, Vibration Measurement Engineers, Chicago, discussed "Measurements of Vibrations Due to Blasting." Using a set of slides to illustrate his points, Mr. Jenkins described the principle and action of the seismograph, the principle of ground and air wave action, the effect of wind on sound waves, etc. A stripped down model of the seismograph used for these tests was also shown. He also told of a quarry which had steadily reduced the size of shots without reducing the number of complaints received. Slides illustrated the vibration effect in this quarry of 2-hole standard shots and 4-, 8-, and 12-hole delay shots. Best results were obtained in this quarry with the 8-hole shots which were a considerable operating economy over the 2-hole shots which had been made. According to Mr. Jenkins most other quarry operators could obtain equally satisfactory results by having such tests made. Movies of several shots in slow motion clearly illustrated the action obtained in a delay shot.

In answer to numerous questions Mr. Jenkins said that exposed Primacord should always be covered with loose dirt when near buildings in order to deaden the sound and

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Labor Requirements in Cement Production—A Statistical Survey

By ALFRED W. COLLIER AND CLYDE STONE
Bureau of Labor Statistics
U. S. Department of Labor

another P-Q exclusive

ONE of the basic materials used in any construction program is portland cement. On this account, and because the industry was in a most favorable position to resume peacetime operations, the Bureau of Labor Statistics has selected the cement industry for its first in a series of studies of labor requirements for construction materials.

This study derives special significance from the fact that a large volume of construction of all types has been anticipated for 1946. Construction needs for cement during the year were estimated at approximately 131 million barrels. The annual capacity of the industry is estimated at 220 million barrels, which could be increased to 280 million by adding to the number of work shifts. It is noteworthy that no apprehension regarding availability of cement as needed has been expressed in public or private analyses of the building material shortages.

About 80 operations are necessary for the production of portland cement of a quality which meets modern specifications. The initial step is the quarrying of the raw materials; and, as a second step, the raw materials are ground to a fine powder for the dry process of manufacture, or are reduced to a slurry by mixture with water when the wet process is used. Properly proportioned mixtures of the materials are fed into kilns and fused into a product called "clinker." After the addition of a small quantity of gypsum, the clinker is reduced to a fine powder known as portland cement.

Man-Hour Requirements in Manufacturing and Mill Operations

The 52 plants surveyed in the study, forming the basis for this article, represent an aggregate annual rate of production of 47,543,037 barrels of cement, requiring a total of 23,020,523 man-hours of labor.

Table 1 shows total man-hours for each of the major departments of the plants, and the man-hours required to produce 100 barrels of cement in 1945-46. Comparative data on man-hours per 100 barrels are also given for 1934.

In general, fewer man-hours were required to produce 100 barrels of cement in 1945-46 than 11 years earlier. There were wide deviations from the average in some plants. The basic factors affecting labor requirements—such as rate of production, size of plant, age of plant, number and size of kilns, and degree of mechanization—in 1945-46 remain the same as pertained to the study made in 1934.

Table 1.—Man-Hour Requirements in Cement Manufacture, 1934 and 1945-46.

Major Departments of Plants	Total Man-hours (in Thousands)	Man-hours per 100 Barrels	
	1945-46	1945-46	1934
All departments	23,021	48.4	55.0
Quarrying	2,689	5.7	7.7
Processing	8,733	18.4	18.0
Shipping	2,581	5.4	6.3
Maintenance	2,629	5.5	6.0
Mill overhead	3,442	7.2	9.6
Administration	2,947	6.2	7.4

Quarrying Operations

The materials obtained from the quarry are usually located on or adjacent to the plant site and man-hours necessary for delivery of these materials to the plant are included in the requirements shown for this department. Estimates of man-hours required for production and transportation of raw materials other than those obtained from the quarry are presented in a following section.

A substantial reduction in quarrying operations of 2.0 man-hours per 100 barrels of finished cement was effected between 1934 and 1945-46. In the 52 reporting plants, total man-hours in the 1945-46 period were 2,688,858, and the average per 100 barrels was 5.7 man-hours. The range in individual plants was from 1.2 to 19.7 man-hours per 100 barrels.

One reason for the reduction in man-hours in the past 11 years, as well as for the variation in man-hour requirements in this study, was the improvement in quarrying machinery. More general use of electric and Diesel-powered shovels with increased capacity and greater mobility was largely responsible. In some plants the use of Diesel trucks has resulted in greater efficiency and flexibility in the quarrying operation.

Processing Department

In 1945-46, 52 plants accounted for 8,732,921 hours of employment in the processing department. To process 100 barrels of cement required an average of 18.4 man-hours for all plants, an increase of 0.4 man-hours since 1934.

The data presented reflect only a slight change in man-hour requirements since 1934. This tends to understate the actual change in productivity, because specifications became more exacting in the intervening period. Technical improvements have kept pace with changes in specifications which required improvement in quality of the finished product, thus holding down the man-hour requirements per unit produced near the level shown for 1934. Considering the more exacting specifications, the fact that the data show little change in man-hour requirements in the two periods studied is indicative of a marked improvement in productivity for the processing department.

Labor turn-over and labor shortages were felt by all plants in this department until late in 1945. The effects of the war in drawing off trained men created acute labor shortages, which resulted in the use of inexperienced labor in semiskilled and skilled jobs and tended to limit reductions in man-hour requirements which might normally have occurred in processing operations. The trend is now being reversed as discharged servicemen return to their former employers and as activities in war industries terminate.

The processing department is divided into five operational functions or sections. The average number of man-hours expended per 100 barrels in 1945-46, by processing functions, as compared with the earlier study in 1934, were as follows:

	Man-hours per 100 Barrels	
	1945-46	1934
All sections	18.4	18.0
Raw department	5.5	5.2
Clinker department	5.2	4.6
Finishing department	3.1	3.1
Coal mills	1.3	1.5
Power department	3.3	3.6

The raw department man-hour requirement per 100 barrels in 1945-46 was 5.5. This exceeded the requirement in 1934 by 0.3 man-hour. In the clinker department, where the raw materials are burned in the kiln, man-hours increased 0.6; and in the finishing department, where the clinker is finally pulverized, gypsum is added, and the finished product is produced, no change occurred in the man-hour requirement.

For each 100 barrels of output, 1.3 hours were expended in the coal mills, where coal is treated and prepared for firing of the kilns. This average is based on the production of all plants, without regard to type of fuel used. Variations are considerable among the cement plants, depending upon the type of fuel used. In plants where gas or oil is the primary fuel, there are no requirements for fuel preparation.

A break-down was prepared showing man-hours required for those plants which used coal exclusively as compared with those which used natural gas, fuel oil, or combinations thereof with coal. Plants which used coal exclusively required 2.0 man-hours of employment per 100 barrels, while those which used, in addition to coal, fuels which did not have to be treated (for example, oil and natural gas), had 1.1 man-hours per 100 barrels.

In the power department, 3.3 man-hours were needed for each 100 barrels of output. The average decrease since 1934 in this department was 0.3 man-hour. Data for this department can be separated into plants which generate their own power and plants which purchase power from a utility. The latter plants, in which the functions of the power department are limited to distributing the purchased energy, require relatively fewer man-hours.

Analysis of 43 reporting plants showed that 12 plants generated all the power they consumed. To produce 100 barrels of cement, these 12 plants required an average of 7.4 man-hours in the power department. Twenty-five plants purchased their power supply from local utilities and, accordingly, only 2.1 man-hours were required in their power departments. In addition to these two groups of plants, there were six which generated part of their power requirements. In most cases the amount of purchased power was considerably less than that generated and the man-hour requirement was 6.0 per 100 barrels of cement produced.

Shipping Department

The shipping department has two main functions: (1) Packing and loading and (2) bag handling and repairs. Upon completion of the manufacturing process, cement is stored in bulk in bins and silos and held for shipment. The trend among most cement plants is to increase shipments in bulk and in paper bags and to decrease shipments in cloth bags, eliminating not only some administrative expense involved in the accounting procedure for cloth-bag refunds and returns but also the cost of sorting, cleaning, and repairing returned bags.

In a special study of a portion of the sample, the shipments of 31 plants were analyzed. The total shipped by these plants during the period studied was 24,080,787 barrels. Of this total, 27.6 percent was shipped in bulk, 50.1 percent in paper bags, and only 22.3 percent in cloth bags. The above figure of 24,080,787 barrels represents 48.0 percent of the total shipments from the 52 plants.

In terms of man-hours of employment per 100 barrels of cement, 5.4 hours were required in the shipping operation during 1945-46. This is a decrease of 0.9 from the 6.3 man-hours reported in the 1934 study. Bag handling and repair accounted for 0.8 man-hour per 100 barrels, and packing and loading for 4.6 man-hours. Total man-hours in the shipping department for the 52 plants studied were 2,581,387. The range between plants was from 0.6 to 15.9 man-hours.

Maintenance and Overhead

Maintenance — In general, maintenance work includes the labor of the shop and repair gangs which overhaul the machinery during periods of shut-down. In 1945-46 yard employment data have been transferred to the mill overhead department. The man-hours required for maintenance operations are as follows:

	Man-hours per 100 Barrels	
	1945-46	1934
Total maintenance	5.5	6.0
Shop	2.0	2.4
Repair gang	3.5	3.6

Man-hour requirements per 100 barrels for this department decreased 0.5 since 1934. This can be attributed largely to labor shortages and curtailment of maintenance operations during the war years, as well as through 1945. Plans for extensive maintenance operations on the part of many cement manufacturers will increase the man-hour requirements for this department in the immediate future.

Mill overhead—Data showing the average number of man-hours charged to overhead, as compared with the 1934 survey, are given below:

	Man-hours per 100 Barrels	
	1945-46	1934
Total mill overhead	7.2	9.6
Mill office	1.4	1.5
Storeroom	.5	.6
Laboratory	1.5	2.1
Superintendents and foremen	1.2	1.5
Watchmen	.6	.8
Yard	1.6	2.5
Miscellaneous labor	.4	.6

The labor shortage during the period studied was, as in the maintenance department, a large contributing factor in the decrease as compared with 1934. Greater reductions in employment can be expected in overhead operations than in production operations when labor shortages develop. Should an adequate labor supply lead to increased employment in this department, average requirements per unit produced may remain stabilized near the level here shown for 1945-46, if anticipated increases in the production of cement materialize.

Administrative Department

This department includes the employment necessary to operate the general offices and selling organizations. Because many plants kept inadequate man-hour records for these employees, a special study of 23 plants was made. Upon this basis it was estimated that the average number of man-hours required per 100 barrels of production was 6.2, and that 2,946,633 hours of employment were required for the administrative functions in the 52 sample plants.

Variations in Labor Requirements

By Rate of Operation and Plant Capacity—In determining the man-hours necessary to produce 100 barrels of cement, the rate of operation and the plant capacity must be taken into account. From Table 2, it is apparent that as percent of capacity

utilized approaches the maximum, the total man-hours required in all departments are generally lower. From Table 3, it appears that the larger producers tend to show greater efficiency in manufacturing operations.

The greatest variation in man-hours exists in the manufacturing process. In plants operating at more than 80 percent of capacity, as shown in Table 2, only 16.6 man-hours per 100 barrels of production were required in manufacturing, whereas those operating at less than 40 percent of capacity required 38.5 man-hours. The average requirement for all plants was 31.1 man-hours.

Table 2.—Average Number of Man-Hours Required to Produce 100 Barrels of Cement in 1945-46, by Rate of Operation

Percent of Capacity Utilized	Number of Plants	Man-hours per 100 Barrels			
		Total	Quarrying	Manufacturing	Shipping
All plants	52	42.2	5.7	31.1	5.4
Less than 40 percent	12	49.6	5.4	38.5	5.7
40 to 60 percent	24	50.3	6.8	37.2	6.3
60 to 80 percent	9	38.9	4.9	29.0	5.0
80 to 100 percent	7	25.4	4.6	16.6	4.2

Table 3 furnishes a break-down of the 52 plants of the sample according to capacity in 1945-46. Again a wide range occurs in the manufacturing departments, with the largest producers reporting 24.7 man-hours per 100 barrels and the smallest 39.9.

Table 3.—Average Number of Man-Hours Required to Produce 100 Barrels of Cement in 1945-46, by Annual Plant Capacity

Capacity	Number of Plants	Man-hours per 100 Barrels			
		Total	Quarrying	Manufacturing	Shipping
All plants	52	42.2	5.7	31.1	5.4
Over 2,500,000 barrels	8	33.1	4.1	24.7	4.3
2,000,000 to 2,500,000 barrels	5	37.4	5.5	26.7	5.2
1,500,000 to 2,000,000 barrels	10	44.9	5.5	33.9	5.5
1,000,000 to 1,500,000 barrels	17	51.0	6.6	37.1	7.3
Under 1,000,000 barrels	12	54.2	9.3	39.9	5.0

By geographic areas—The variations in labor requirements among geographical areas, for the 52 plants studied, are shown in Table 4. Plants in the Pacific States lead in productivity with the plants in the Southeast next in order. On the basis of productivity, the relative position of plants in the Pacific States remains unchanged since 1934. Plants in the Mountain States show the highest man-hour requirements, 60.2 man-hours per 100 barrels. Plants in the Lehigh Valley area are nearest the average of all plants included in the survey with 41.1 man-hours per 100 barrels. Among the factors which affect the range of man-hour requirements by geographic areas are production rate, size of plant, age of plant and equipment, process of manufacture, and type of fuel used.

Total Man-Hour Requirements for Production and Transportation

The preceding sections have developed in detail, from basic plant records, the man-hours required at the plant to manufacture 100 barrels of cement. The following section estimates the additional man-hours required to extract those raw materials not hitherto considered, to haul these materials to the plant, and to transport the finished cement to the construction site.

These operations (production of additional raw materials, and transportation), as indicated below, require an estimated 52.1 man-hours in addition to the 48.4 required at the plant. Thus, 100 barrels of cement delivered to a job site represent an over-all investment of approximately 100.5 man-hours of labor.

	Man-hours per 100 Barrels	
	1945-46	1934
Total production and transportation	100.5	126.4
Raw materials, production	13.0	14.1
Raw materials, transportation	10.6	6.6
Quarrying, manufacturing, shipping and administration	48.4	55.0
Transportation, finished cement	28.5	50.7

Production of Raw Materials

The materials used in cement manufacture are in the main (1) limestone, shale, clay, and other materials obtained from the plant's quarry, (2) gypsum, and (3) coal. Usually the first of these materials is obtained from a quarry located on or adjacent to a plant site, and this operation is covered in the man-hours required for the manufacturing process.

Required quantities (to produce 100 barrels of cement) of the materials not considered under manufacturing and mill operations, including power, are shown in the statement following.

	Requirements per 100 Barrels 1945-46	
	Amount of Materials	Man-hours to Produce Quantities Consumed
Materials: Total	.....	13.0
Gypsum	0.66 ton	.5
Coal	6.29 tons	8.3
Power (purchased)	1,355 kw.-hr.	4.2

The amount of each material required in the manufacture of 100 barrels of cement has been calculated from Bureau of Mines tabulations of materials consumption in all cement plants in the country in 1945. The man-hours required to produce a unit quantity of each material were obtained by relating pro-

Table 4.—Average Number of Man-Hours Required to Produce 100 Barrels of Cement in 1945-46, by Geographic Areas

Area	Number of Plants	Annual Production Barrels	Man-hours per 100 Barrels			
			Total	Quarrying	Manufacturing	Shipping
All areas	52	47,543,000	42.2	5.7	31.1	5.4
Pacific	6	9,012,000	24.6	4.8	16.0	3.8
Southeast	5	5,955,000	38.7	5.7	27.0	6.0
Lehigh Valley	4	5,485,000	41.1	5.3	29.8	6.0
Middle West	15	14,334,000	45.8	5.9	34.5	5.4
Northeast	6	3,887,000	47.4	4.9	37.0	5.5
Southwest	11	6,649,000	53.8	6.5	40.9	6.4
Mountain	5	2,221,000	60.2	7.5	46.1	6.6

duction and man-hours data available in the Bureau of Mines, the Federal Power Commission, and the Bureau of Labor Statistics.

Information was not available for estimating the employment created through the purchase by cement mills of materials used in small quantities, such as sacks, lubricants, explosives, and repair parts. Inasmuch as quantities of these materials were very small in relation to total production of cement, lack of these man-hour estimates is believed to have a negligible effect on the total estimate of labor requirements.

Transportation of Raw Materials and Finished Cement

Data published in a previous study by the Bureau afford a basis for computing rough estimates of the man-hour requirements for the transportation of the coal and gypsum consumed in the production of 100 barrels of cement. Total man-hours required for transportation of these materials was 10.6 man-hours; for transporting coal, 9.6 man-hours were required, and for transporting gypsum, 1.0 man-hours.

The total man-hours needed to transport 100 barrels of finished cement from the plant to the point of use are estimated to be 28.5. To haul 100 barrels of finished cement by rail from the plant to the railhead requires 16.2 man-hours, and by truck from the railhead to the construction site 12.3 man-hours.

Trend of Productivity, 1930 to 1945

According to data prepared by the U. S. Bureau of Mines, output per man-hour of quarrying and manufacturing labor in the cement industry increased from 1.79 barrels in 1930 to 2.59 barrels in 1942, the year in which the highest rate of productivity has been achieved. The rather steady trend toward greater productivity was interrupted during the depression of the thirties and again during the war years.

Construction of new plants and modernization of many old ones appear to be largely responsible for the increase in output per man-hour during the first 8 years of the series shown below. Changes in productivity in recent years, however, tend to vary directly with the rate of capacity utilization. In 1942, when the highest rate of capacity utilization was reached, the number of barrels produced per man-hour was 2.59, whereas in 1944, when capacity utilization dropped sharply, the number of barrels produced was 1.99. In 1945, however, with increased production and plant utilization, output per man-hour again increased, reaching 2.10 barrels per man-hour.

The average number of barrels of cement produced per man-hour and the number of man-hours required in the production of 100 barrels for each year, 1930 to 1945, are shown below:

Year	Average Number of Barrels Produced per Man-hour	Average Number of Man-hours Required to Produce 100 Barrels
1930	1.79	56.0
1931	2.07	48.2
1932	2.00	50.1
1933	2.01	49.7
1934	2.06	48.6
1935	1.96	51.1
1936	2.19	45.6
1937	2.12	47.1
1938	2.21	45.3
1939	2.38	42.0
1940	2.40	41.7
1941	2.57	38.9
1942	2.59	38.5
1943	2.25	44.4
1944	1.99	50.3
1945	2.10	47.6

50 Years of Liner Practice

(*From page* 86)

the development and adoption of a new high-carbon-steel liner. The rib or projection for lifting the ball charge is formed by a bevelled lifter bar which is a separate element from the flat-rolled high-carbon-steel shell liner plates. The lifter bar is made of molybdenum alloy steel and is designed to wedge the liner plates against the mill shell through the action of long bolts which pass from the lifter bar to the outside of the mill shell. The arrangement is illustrated in Figs. 9 and 10.

The design of the lifter bar permits reversing it when one "toe" has been worn off. The carbon-steel shell liners may remain in service for several periods at the end of which the lifter bar may be reversed or replaced. This type of liner will show a lower scrap loss than the conventional liner with integral rib. In addition, the cost of a set of high-carbon-steel liners will be lower in most instances than that of chromium-steel liners. Lower cost of installation is another factor in favor of the high-carbon-steel liners with separate lifter bars. These are manufactured to a high degree of accuracy by rolling and are to fit into a mill shell. Less time out for mill maintenance is obtainable due to shorter time required for installation.

High-carbon-steel liners do not need to be as thick as conventional liners for a given diameter grinding mill, thereby increasing the internal volume of the grinding chamber. The liner plates are solid; holes for the passage of holding bolts go through the lifters. This type of liner can be applied to existing mills now using cast liners with integral lifting rigs.

Fig. 8 shows the comparison of a shiplap-wear liner with the Allis-Lorain plate and lifter bar liner.

As mentioned above, in dry-grinding ball-peb and tube mills in which fine grinding is conducted, it is still customary practice to line the grinding chambers with chilled cast-iron liners. However, high-carbon-steel liners are recommended in finish-grinding compartments of wet mills and their use is also becoming more general for finish dry grinding work owing to the improved service obtainable with decrease in grinding cost.

Blocks of silica as mill liners and quartz pebbles as the grinding media are still used in grinding materials where contamination with particles worn from the metallic grinding media and liners would be detrimental to the product either from the standpoint of objectionable coloring or chemical analysis required for a subsequent process. Industrial requirements involving fine grinding where iron oxide stain would be undesirable are found for example in the preparation of sands in glass making.

State Legislatures to Get Bills for Highway Funds

In an engineering study submitted to the California joint legislative fact finding committee on highways, streets and bridges by G. Donald Kennedy of Washington, D. C., it was stated that California should spend $2,246,000,000 on highways during the 1950-60 decade. It was indicated that existing tax sources would fall about $750,000,000 short of such a goal; but a tax study to be submitted later was expected to suggest ways and means of securing the needed revenue. Mr. Kennedy is consultant for the interim legislative committee, which is headed by State Senator Randolph Collier.

In Ohio the passage of enabling legislation will be sought during the 1947 session of the legislature for a 1,000-mile network of five toll-financed superhighways costing about $650,000,000.

Initiation of a five-year program calling for expenditure of $100,000,000 for the improvement of West Virginia's secondary roads will be proposed during the 1947 session of the state legislature.

Who are the important nonmetallic minerals producers in New York—California—Minnesota? Only the Pit and Quarry Directory can tell you.

THE LIME PLANT OPERATOR

BY WOLF G. BAUER

HYDRATION IN THEORY AND PRACTICE
PART I—Elemental Concepts

Wolf G. Bauer

BEGINNING with this issue of PIT & QUARRY, the writer intended to start a series of dissertations on the fundamental concepts of the hydration process, and their practical applications. However, as the writing of the articles progressed, it seemed that the explanations of facts and terminology became as voluminous as the subject matter itself. The realization soon came that this would become extremely confusing, and that in order to present this material simply and directly, explanations of fundamental physics and chemistry should precede the subject matter in a separate presentation.

Twenty or thirty years ago, this type of discussion would have been considered out of place in a periodical and department such as this. Today, as lime plants are considered more and more in the light of chemical plants, and we blink unbelievingly into the sunrise of the Atomic Age, it behooves us to make some attempt, if we have not already done so, to look more closely at our chemical tools, materials, and concepts in the light of changing theories and beliefs. The following discussion should therefore be read in the spirit in which it is written, namely, as a helpful review and attempt to help us correlate and visualize in our mind's eyes those phenomena with which we are in daily contact in our work.

In studying, visualizing, and applying the process of hydration, we come to realize at once that here is truly a field of little specks of matter going through all sorts of contortions just out of reach of our vision, in fact, just out of reach of the mental visualization of most of us. In the past articles we have glibly used the terms of solid, liquid, gas, heat, heat transfer, temperature, radiation, convection, evaporation, friction, chemical reaction, etc., as stated facts, leaving their meaning to the reader's imagination or schooling. However, it becomes more apparent every day that physics and chemistry are ever more closely interrelated in their elemental aspects and definitions, and that what we still remember from the classroom lecture in this field has often been entirely replaced and re-defined in the light of new discoveries. To be honest and at peace with one's self, it is necessary for many of us to be able to translate a term, theory, or law into some mental action picture first, else interest and understanding will be lacking.

It may not be imperative for the practical operator to look at his hydrating or calcining process thru the eyes of a physicist, yet in this day and age we should at least have a smattering of the significance of the terms we use in describing and explaining certain reactions. Let us be humble and realize that often some of the most self-evident phenomena are most difficult to explain except by higher mathematics. When we try to grasp the significance of the astounding fact that mathematically matter and energy are interchangeable, we may feel mentally defeated, no matter how many proofs or explanations we may try to digest. At the risk of making the calcination and hydration process appear too involved to the casual reader, and too crude and incomplete to the technical observer, the writer feels justification for this review as an item of interest, if not a guide for process improvements.

MATTER

Elements We have now discovered 94 different basic elemental substances which by themselves or in combinations make up all matter around us. We are mostly concerned with 5 of these, namely, calcium, magnesium, oxygen, hydrogen, and carbon. Each one of these elements in its smallest form has a different weight. When these elements were arranged in order of their weights, it was noticed that at numerical intervals of 8:8:18:18:32 the elements were of chemical similarity. Magnesium in 12th place is similar to calcium in 20th.

Atom The smallest particle that constitutes an element is the atom. The atom itself, we have learned, is not just a simple flake of elemental matter or substance, but is something of a little solar system in itself, composed of a small, dense, positively charged center or nucleus exerting a balanced pull on one or more spinning, negatively charged particles or electrons describing relatively wide orbits around it. (Buzzoni gives an illustration of the relative distances involved by comparing the nucleus of a hydrogen atom to a pea located at St. Louis, and its electron, the size of a small house, describing an arc thru Little Rock and Chicago.) We are also told that the atoms are always in continuous motion, bouncing back and forth against each other without friction loss at terrific speeds, but relatively small degree of freedom. The electrical or energy forces which hold the electrons in their orbits determine the chemical reactivity of the various atoms toward each other, as well as the binding force that keeps vibrating them close together in a molecule. The speed of atom and molecule vibration is dependent on the temperature, the degree of mobility or range of motion or whether the atom or molecule is in a solid, liquid, or gaseous state.

Molecule When two or more atoms unite (vibrate close together in equilibrium) they form a compound. The smallest particle or unit of a compound is the molecule, and which is a more or less stable arrangement of the constituent atoms. Some molecules are made up of alternate repeated atoms in chain form, and become large enough to be distinguished in the electron microscope. Molecules are also in more or less violent but

restricted motion, depending on the temperature or energy level.

Crystal When atoms and molecules have been given time and freedom to orient themselves into the stablest equilibrium or vibrating position of attraction and repulsion, they do so in a symmetrical pattern, this pattern being a function of the particular atoms and molecules involved. This arrangement or orientation of atomic and molecular forces is generally referred to as the space lattice of the cell or crystal structure. Under certain condition of change of state as well as time, temperature, and pressure, such an arrangement is multiplied and repeated to such a degree that the boundary planes may be observed with the naked eye in the form of a crystal.

Since the molecules of the carbonate, oxide, and hydroxide of lime arrange themselves into very definite patterns, and along certain planes of symmetry which are repetitions of their molecular pattern, they can be identified by the manner in which they d i s p e r s e rays passed thru them. The crystals of calcite and aragonite are easily identified in the petrographic microscope, as well as dolomite and magnesite. However, the crystals of the oxide and hydroxide of lime and magnesia are generally too small to even be seen in the electron microscope. We infer their presence, orientation, and shape by the so-called diffraction pattern produced when the short X-rays are passed through a powdered sample set into the focal center of a film arc, each particle bending the rays at definite crystallographic plane angles as lines on the film, the position indicating the molecular pattern, the sharpness and width giving an indication of the size and shape of the crystals or particles.

Crystal System All crystals are classified into six different systems, each of which is defined by the relations of imaginary lines or axes connecting the centers of opposite faces or edges of the crystal, and which intersect at a common point. Calcium carbonate (calcite) and hydroxide belong to the hexagonal system, calcium oxide to the cubic or isometric system (similarly magnesium).

ATOMIC ENERGIES

We have recently heard and read a good deal about atomic energy. However, when we come down to elemental facts, all types of energy originate in atoms. We are not here concerned with the energy release obtained in nuclear fission (200 million electron volts per uranium atom as against only a few electron volts absorbed or released during disruption of the outer orbit electrons (valence bond) in the combustion of a fuel molecule) but rather with those energy transformations which bring about chemical reactions and heat transfer. This latter energy is not only manifested in the kinetic or mass-motion energy of the electrons of the atoms, but also in the potential electric or attraction energy which holds them in their orbit.

Conservation of Energy Energy may be defined as the ability to do work, be that electrical, light, heat, chemical, or motion. Since leaving school, we may have learned that there are times when one may get something for nothing, but in the realm of natural laws this is impossible. In other words, energy can neither be created nor destroyed, only transformed from one type to another. Aside from the kinetic energies with which we deal in the mechanical phase of operating our lime plant, we are here mainly concerned in understanding the chemical and heat energies that are being transformed in front of our eyes in the processes of combustion, calcination, hydration, and evaporation.

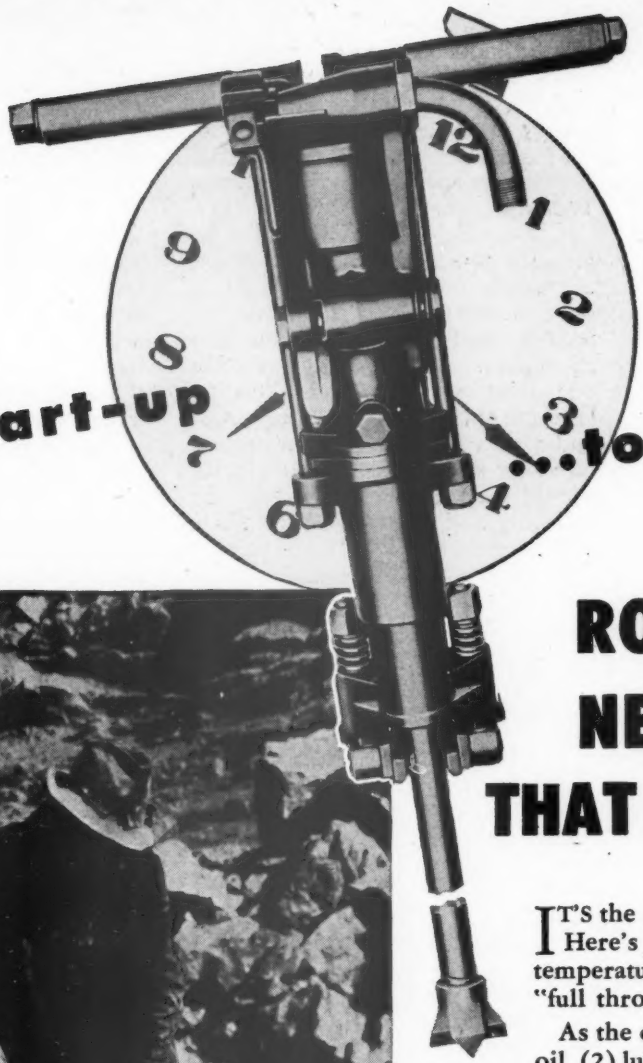
Energy has never been added or subtracted from the universe. What one body loses, the other gains. We find it still holds in the processes of the transmutation of one element from another and the splitting of atoms, processes where mass is actually transformed into energy. Let us define the various energies, and then illustrate their transformations with the processes going on in a lime plant.

Potential Energy When we have elevated a piece of limestone from the bottom to the top of an elevator, this stone has acquired the amount of energy that was expended to elevate it to the top. If it weighed one pound and was raised 50 feet, it would have 1 x 50, or 50 foot-pounds of potential energy. Except for friction loss (heat energy) we can get this amount of work back again from the piece of stone.

Kinetic Energy If our piece of stone falls to the floor again from the top of the elevator, or if it falls on top of the stone pile in a bin and slowly moves down to the floor level with the rest of the stones in the bin, in either case it will end up with the same total energy it had before riding up the elevator. What happened to the potential energy it had on top of the elevator? It lost it again in heat and work done. In moving thru the bin, its contact with other pieces and bin wall caused heat to be generated and lost, whereas in the case of falling to the floor it acquired kinetic or motion energy due to its velocity. This energy increases as one half the square of the velocity, and was again completely used up, not only in friction heat loss to the air and the floor on impact, but also in the work expended in breaking or cracking either the stone or the floor, or digging a hole in the ground.

When we fill a sack of lime from a spout, we notice that during the time of greatest flow, the scale reads higher weight values than are possible with the amount of lime in the sack at that instant. Kinetic energy of the falling lime particles is again transformed, lost to the lime and gained by the scale as work done in shifting the balancing mechanism over and above the amount due to lime weight alone. Since this energy is dependent mainly on velocity, we can realize why a piece of straw of little weight or mass can be driven into the trunk of a tree by the force of the wind,—providing the velocity of the piece is sufficiently high. Let us keep this in mind when visualizing the energies of atoms and electrons. The mass of the nucleus of even the heaviest atoms is small enough, yet the mass of an electron whirling around it is only 1835th that of the nucleus of a hydrogen atom, which is the lightest.

Heat Energy All particles of matter contain some of this energy, no matter if we consider an ice cube or a hot piece of lime. In its elemental state it is really kinetic energy of the atoms and molecules in violent motion, the higher this energy level (the hotter the mass of molecules constituting a solid, liquid, or gas) the higher the rate of vibration or speed of the molecules, and the higher we say is the temperature of the substance. In the field or world of atoms and molecules, all motion stops at the absolute zero temperature, which is 460 deg. F below 0 deg. F. However we have never quite reached this low. Molecular motion increases from this point up the scale. Besides this heat energy due to atomic or molecular motion, we also consider another form of heat energy, namely radiation energy.



ROCK DRILLS NEED AN OIL THAT DOES 5 JOBS

IT'S the start of the shift—the drill is cold. Here's Job No. 1 for the oil you use: low-temperature fluidity for easy starting . . . for "full throttle" drilling without delay.

As the drill warms up, it demands that the oil, (2) lubricate safely despite extreme shock loads, (3) resist oxidation which would result in gum and carbon formation, (4) form a water-oil emulsion that will give lubrication even though excessive amounts of water get into the drill.

With the end of the shift, you're ready to stop, but the oil in the drill must go *right on working.* That's because Job No. 5 is protection—rock-drill oil must have high metal-wetting ability to prevent rusting of the precision-ground parts of the cylinder and valves, especially when the tool is idle.

Does this sound exacting? It is. This is a job for Shell Clava Oil—an oil that is specially handled, from crude selection through final compounding, for superior service in percussion air tools.

The Shell Lubrication Engineer will give you advice about the lubrication of any compressed air equipment. For informative literature, write Shell Oil Company, Incorporated, 50 West 50th St., New York 20, N. Y.; or 100 Bush St., San Francisco 6, Calif.

SHELL COMPRESSED AIR LUBRICANTS

SHELL

Radiant Energy Now we come to a phenomenon which is not only most difficult to explain or visualize, but about which there is still a great deal of controversy among foremost investigators. We know, for example, that with some fuels as much as 50 percent of generated heat is given off in the form of radiant energy. Where does this energy come from, and how is it transferred? In the case of fuel, this energy is stored or locked up in the hydrocarbon molecules that composed the vegetation from which the fuel originated. The plants in their leaf structures have that remarkable ability to form carbohydrates (cellulose and sugar and starch) from the CO_2 of the air, and the water in the ground, a chemical reaction on which all organic life on this little earth of ours is based. To form this union of carbon, hydrogen, and oxygen molecules in the chlorophyll matter of the plant leaves, light energy from the sun is required. As long as the atoms and molecules of fuel are in normal speeds of vibration or motion, this energy stays intact. When the fuel is heated and brought in contact with oxygen, however, the disruption of the valence or outer electron forces in the reaction causes such increases in the speed of both the atom vibration and the electrons whirling around the nucleus in each atom, that the electrons are made to whirl in an even wider orbit (expanding the atom space of influence). From the law of conservation of energy, we would expect that as soon as the force that pushed the electrons out of their normal paths is reduced or removed, the electrons will return to their lower energy inner orbits, losing thereby the amount of energy they received while being pushed out; just as our piece of stone lost all its potential and then kinetic energy while it hit the ground at the bottom of the elevator. The Danish physicist Bohr advanced the theory that this minute energy loss is radiant energy, given off in the form of "quanta" or photons, which travel as waves at the speed of light, their vibration frequency and wavelength being a function of the energy level (small or large orbit) of the displaced electron.

All this is becoming exceedingly confusing, especially as space does not permit further elaboration for those who are interested, and must therefore be referred to the many so-called popularized treatises on modern physics. As we are still concerned with ordinary chemistry and heat-exchange problems, only the kinetic and electric energy of the atoms and electrons is of immediate interest, and no attempt is made to touch upon the nucleus of the atom, and which holds by far the greatest energy of matter.

Heat Transfer To transfer heat from one substance to another, be that liquid, solid, or gas, we must have either contact, a transfer medium (also contact), or a more or less open path for photons to travel between the two substances. We must also maintain one substance at a higher energy level (temperature) of moving atoms and molecules than the other or heat receiving substance. Let us picture several heat exchange reactions in calcining and hydrating lime. Pulverized coal is burned in a rotary kiln. The chemical oxidation reaction of carbon and hydrogen with oxygen causes such a disturbance and rapid rearrangement of atoms and molecules (because stored energy in the fuel molecule is released) that the newly formed molecules of CO_2 and H_2O are at a high vibration rate. Every time they collide with another molecule of either fuel or one of the air molecules and atoms, they impart part of their excessive vibration to it, which in turn passes its new speed to the next, and so on until the intervening molecules to the piece of lime or stone have been raised in velocity (kinetic energy or temperature) such, that the contacting gas molecules begin to speed up the motion of the lime molecules at the surface of the lime pieces, and which in turn excite those next to them, raising the molecular energy or vibration of the lime molecules. In the world of atoms, this is really heat transfer by conduction. In our mass-effect world, it is termed convection transfer.

At the same time, the agitated electrons of the atoms undergoing rearrangement in the combustion process fling out bits of photons as they return to their smaller normal orbits, these photons or bits of radiant energy traveling in straight paths at the speed of light, and being absorbed or reflected by the molecules in their path. Since they travel in a spherical wave front like light, their intensity and effect diminishes with the distance traveled, as well as by absorbing or reflecting disturbances met on the way to the lime, such as dust or gas molecules. This radiation or photon emission does not only take place from the molecules undergoing chemical combustion reaction, but also from any dust, lime, or kiln lining surface in the path of which another surface of lower energy level may absorb such energy.

STATES OF MATTER

There are many instances which prove to us that substances may exist in the form of a solid, liquid, or gas, as well as an intermediate state of solution. These states or phases of existence are quite readily explained by the atomic and molecular theory or concept of matter and energy. When a substance is in the solid state, its atoms and molecules are in their closest arrangement pattern, generally the most stable condition due to the low energy level and motion of the unit particles. Being very close to each other, the force which holds them together is also quite large, and the motions are restricted to very small vibrations, depending always on the particular temperature.

As a solid mass is energized (heated) by contact with photons (radiation) or contact with more highly vibrating other atoms and molecules (conduction), the motion of its own elemental particles increases to a point where the distances between them are increased, and the attractive forces holding the individual molecules in some definite pattern of alignment become less pronounced. This allows shifting and translation of position between the molecules, a state of condition which we describe as the liquid or molten form of a solid. Further increase in energy of this liquid system causes a greater and greater number of the more and more violently oscillating molecules to break thru the tightly stretched surface layer of molecules of the liquid. In the free and exceedingly mobile state or freedom of their escaped molecules of "vapor" of the liquid state, they immediately fill the space above the liquid, exerting their own pressure (impact frequency) in the gas medium in which they are moving. Some of these escaped molecules bombarding the liquid suface may reenter. When the number reentering the liquid is equal to the number escaping, the system is in balance, and no further evaporation or vaporizing of the liquid is noticeable. As the energy of the liquid system is increased to the boiling point (when the molecules in the liquid near the heat-receiving surface break free of their liquid holding bond due to their great motion, they form vapor or gas at such pressure as to balance the atmospheric, or above-surface gas pressure, and thus rise as bubbles up thru the liquid) the liquid may completely change to the vapor form. Some atoms or molecules are in this expanded and widely separated state of motion at ordinary conditions of

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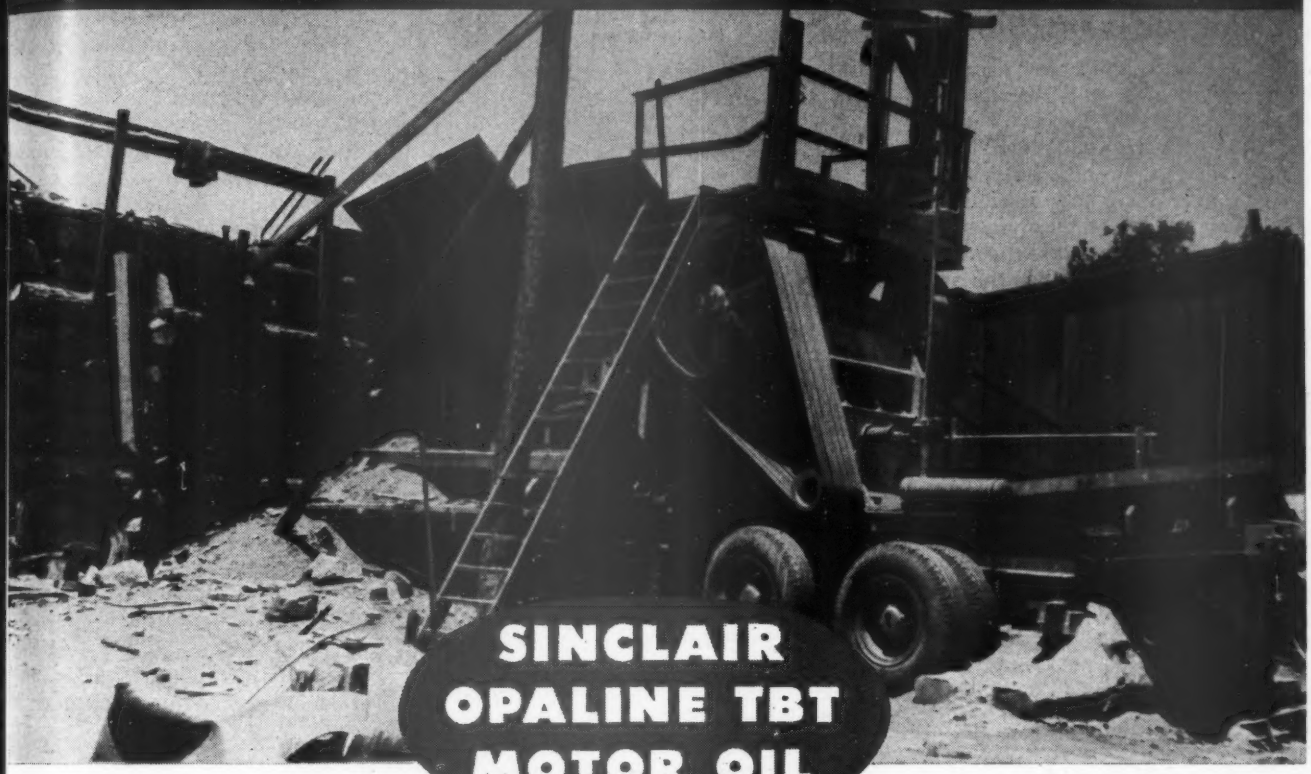

When the load is heavy and the pull steady, make sure the crankcase lubricant is designed to serve efficiently for hard service. Ineffective lubrication can promote costly mechanical breakdown.

Sinclair OPALINE TBT MOTOR OIL is made for continuous operation under heavy load at high engine temperatures. The crude is selected for stamina and refined for durability.

TBT is further fortified in the refining to provide what it takes to keep engines clean, hold crankcase accumulations down and prevent bearing corrosion. For top engine performance under heavy load and steady pull, choose OPALINE TBT MOTOR OIL . . . and for Diesels use Sinclair TENOL.

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temperature and pressure. They are then called gases. Cooling may liquefy both vapors and gases, a process called condensation. This is merely a slowing down of molecular vibration, coupled with a closer crowding together, so that the attracting forces exert themselves, holding the molecules in a denser condition.

CHEMICAL REACTION

Atoms and molecules may combine or break up under certain conditions. They do this only in very definite proportions. When it happens, heat is either absorbed or given out. Such heat is caused by the breaking up or readjustment or balancing of the electric (valence) forces, which depend on the number of electrons in the outermost orbit of each type of atom, and which in turn determines the electric charge (attraction or repulsion capacity) of the atom or molecule. Such reactions tend to go toward a more stable (lower energy) state from a more excited or reactive unstable state of molecular bond.

The reader should remember that this is not a complete picture by any means, and that many factors and phenomena with which every chemist is familiar are omitted for the sake of simplicity.

Each substance has its own reaction energy transformation, plus or minus. Thus in the reaction $CaCO_3$ + heat = CaO + CO_2, we note that from the standpoint of conservation of energy, this equation is not balanced. We might rewrite it as follows: $CaCO_3$ + (heat or stepped-up molecular motion energy) = (CaO + higher electric or valence energy) + CO_2 + (energy of CO_2 bond disruption). By adding this extra valence energy to the lime molecule, an unstable compound has resulted; i.e. having a surplus energy, the molecule seeks to dissipate or loose it. Certain other molecules like carbon dioxide, sulfur, and water are most easily attracted by calcium oxide, and arrange themselves quickly in equilibrium patterns with the lime molecules, and form thereby more and more stable compounds. We would now expect, that as the CaO molecules become less excited, energy in the form of heat be given off during these combinations into stabler forms. This is precisely what we find, the hydration reaction being a familiar example.

Before discussing the process of hydration in next month's article, it may be well to briefly examine the make-up and structure of the substances with which we will be concerned, namely calcium oxide, hydrogen peroxide, and calcium hydroxide.

In measuring particles below the resolving power of the human eye, the micron (u) and the Angstrom Unit (A) become the measuring sticks. One micron is equivalent to .00004 inches, or .001 millimeters. An Angstrom Unit is equal to .0001 microns. By the use of short wavelength rays, it has been possible to take measurements in atomic and molecular dimensions.

The smallest crystal or elemental cell of the carbonate of lime is composed of two molecules, and has a dimension of 6.36 A. The oxide cell is composed of four molecules, and measures 4.79 A, while the single molecule cell of the hydroxide is only 3.52 A in centerline dimension. With the present magnifications used in electron microscopes, it would therefore take an aggregate of at least 25 unit cells to make a crystal large enough to be distinguished. The molecules of CO_2 and H_2O are yet smaller, being 2.48 A and 2.75 A respectively. Since in studying electron micrographs we generally note very little distinct crystalline structure, yet obtain definite crystal indications from X-Ray diffraction lines, we must assume that crystal growth in many commercial hydrates is definitely inhibited. We will have more to say on this subject of crystal growth and transformation.

While talking of crystalline shape and electron micrographs, it might be of interest to mention that the well-known lack of physical change in the shape of the original calcite crystals, as they are transformed to lime, seems to carry on thru to below micron sizes. The writer has not yet been able to identify a true cubic crystal outline of the oxide in such photographs of partially hydrated lime particles. The rhombohedral shape of the carbonate is predominant in many particle shapes which are clear edged and above colloidal size.

(To be continued)

Lime Meeting

(From page 88)

that slamming a door or walking across a room in a house actually creates more vibration than a blast. People overestimate the shock of an explosion because it comes suddenly, whereas trucks or trains, which actually attain a higher peak, build up gradually. Mr. Jenkins also stated that work is now under way on air concussion and auxiliary equipment to measure this has been developed to go with the present seismograph.

A discussion of the drop ball method to replace secondary shooting in quarries was led by J. H. Robinson and Bolton L. Corson. Mr. Robinson said that in one quarry with a 50-foot face of stratified rock a drop ball has done all the secondary breaking at a cost of ½ cent per ton compared to 3½ cents with secondary drilling and blasting. A 1-cu. yd. crane with a 50-foot boom and a 3300-pound ball is used. This crane also spends about half its time knocking down loose material from the face. Important also is the saving on truck tires which were cut by loose rock, and the trouble with compressed air lines, especially in cold weather.

Mr. Corson said that the drop ball is saving them from 2 to 3 cents per ton of rock quarried but that even if no cash saving were made the ball would still be used because of its greater safety and the elimination of cleanup work. Jackhammers are now used only to shoot out toes. On a production of 35,000 tons per month the drop ball is being used in their quarry an average of 4 to 5 hours daily. Mr. Corson then described the 2500-pound ball now being used with a special hitch on a 3¾-inch cable, but no tagline. He also said that the main reason why drop balls have not gained greater popularity is the shortage of good crane operators.

Employee-Management Relations

H. M. Beatty, vice-president, The Kelley Island Lime and Transport Co., Cleveland, presided over the employee-management relations session which brought out much interesting information on outside, inside, and insurance aids. One of the best good will creators is the suggestion system which should be open to both plant and office workers. A nonpartisan committee should decide the rewards to be paid on the basis of savings made and the winners should remain anonymous.

Company magazines were also agreed to be among the best ways to create a feeling of cooperation with management. These should carry a maximum of news and a minimum of propaganda which should never be sugar coated. Material should be short and to the point and plenty of photos should be used. Copies of the magazines should always be mailed to the workers' homes. Some companies employ outside agencies to publish such magazines but it is better to make it an organization affair; the editor should go out and make personal contacts and take his own photos whenever possible.

PERSONAL MENTION

E. H. Kendall

E. H. KENDALL has been appointed division manager for the Permanente Cement Company's new Seattle plant, which opened on October 25.

Mr. Kendall joined Permanente in 1943. He has been associated with the cement industry since 1933, when he was employed by the Pacific Coast Aggregates Company during construction of the Golden Gate Bridge.

During his career with Permanente he was connected with wartime construction projects such as ammunition depots at Port Chicago, Calif., and Hawthorne, Nev.; Hamilton Field (Calif.) airport; and the bomb and gunnery range at Tonopah, Nev.

Prior to joining Permanente Cement Company, Mr. Kendall was Southern California division manager for Chemurgic Corporation, manufacturers of chemical specialties, and later president of U. S. Propellers, Inc., fabricators of airplane parts.

J. S. Young

JOSEPH SAMUEL YOUNG, president of the Lehigh Portland Cement Co., was selected chairman of the board of directors of the Portland Cement Association at its recent annual meeting in Chicago. He succeeds M. Moss Alexander of St. Louis, president of the Missouri Portland Cement Co., who has been chairman of the board for the past two years.

Mr. Young, long prominent in business and civic affairs, was chairman of the War Production Board for the central eastern section of Pennsylvania, during World War II and was also a member of the Cement Industry Advisory Committee of the War Production Board.

Mr. Young entered the service of the Lehigh Portland Cement Co. in 1923, and in 1925 was elected vice president and assistant to the president, Col. Edward Mark Young, his father. He became a director of the company in 1931. Following his father's death, Mr. Joseph S. Young was elected president of the company on May 16, 1932, in which capacity he has served continuously since.

J. L. CONERLY has been promoted from the position of personnel man to assistant superintendent of the Gulf Portland Cement Company of Houston, Tex., a subsidiary of the Ideal Cement Company of Denver. The appointment was made in recognition of Mr. Conerly's part in getting the company's new plant at Mobile, Ala., under way.

CHARLES SLOAN has been appointed chief clerk of the Arkansas Portland Cement Company at Okay, Ark., an Ideal Cement Company subsidiary. He succeeds Chief Clerk Nordean, who has assumed similar duties at the Mobile, Ala., plant of the company.

RICHARD N. COOLIDGE, president of the National Sand and Gravel Association, has been elected a member of the board of governors of the National Highway Users Conference.

STEVE KNAPIK was honored for his 35 years of service with the Warner Company at Bellefonte, Pa., at a dinner held there recently. Members of the firm's Quarter Century Club, the hosts, presented Mr. Knapik with a gift. John Curtin, Jr., vice-president and general manager, was a speaker, and George Kellerman, club president, was in charge of arrangements.

JOHN W. BRADBURY has been made superintendent of the Alpha Portland Cement Company's plant at Jamesville, N. Y. Mr. Bradbury was formerly assistant superintendent of the Green Bag Cement Company of Pennsylvania at Pittsburgh.

R. A. HUMMEL, president-general manager of the Lone Star Cement Corp., was re-elected a board member of the National Industrial Conference Board at its 281st meeting held recently in New York.

Founded in 1916, the conference board is an entirely independent, impartial and nonprofit institution for research and education in the fields of economics, business and management, whose work is supported by 2,600 business concerns, trade associations, labor unions, government bureaus and universities.

ALAN B. WELLS, assistant treasurer of the Universal Atlas Cement Company, United States Steel Corporation subsidiary, has retired from his duties after 46 years of service.

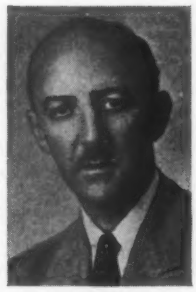
CLARENCE E. KELLEY has become assistant treasurer of the Universal Atlas Cement Company, in addition to his present duties, will supervise credits for the Metropolitan New York, Albany, Boston and Philadelphia territories.

ROBERT A. RAGGIO has been appointed credit manager for these territories.

CHRIS L. CHRISTENSEN, vice-president of The Celotex Corporation and formerly dean of the Agricultural College of the University of Wisconsin, delivered an address in Chicago before the Housing Conference, sponsored by the National Committee on Housing. The title of Mr. Christensen's talk was "Farm Market and Need."

EDGAR M. HASTINGS, chief engineer of the Richmond, Fredericksburg and Potomac Railroad Company, was nominated as the 1947 president of the American Society of Civil Engineers at the fall meeting of the society's board of directors in Kansas City. The nomination, tantamount to election, will be confirmed by the membership, and the new head of the society will take office at the A.S.C.E. annual meeting in New York in January.

GALEN J. JASPER, who was for several years a member of the firm of the Twin City Testing & Engineering Laboratory at St. Paul, has opened offices in that city as a consulting industrial engineer. He has had 25 years of experience in engineering design, construction, tests, inspection and research.



N. B. Newcomb

NORMAN B. NEWCOMB was appointed construction superintendent of the National Gypsum Company, according to an announcement by Melvin H. Baker, president. He will be in charge of all construction in National's expansion program.

Mr. Newcomb has had extensive construction experience with the Port of New York Authority, Anaconda Copper Mining Company and the Phelps Dodge Corporation, the Kellex Corporation and the Vern E. Alden Company. His work with Kellex included eighteen months as head of the Structural Division constructing the gaseous diffusion plant in Oak Ridge, Tennessee, for the concentration of Uranium 235 (U-235), an ingredient of the atomic bomb.

Mr. Newcomb is a member of the American Society of Civil Engineers. He has held offices in the New Jersey Society of Professional Engineers and Land Surveyors and was president of the Kellex Club of Oak Ridge, Tenn.

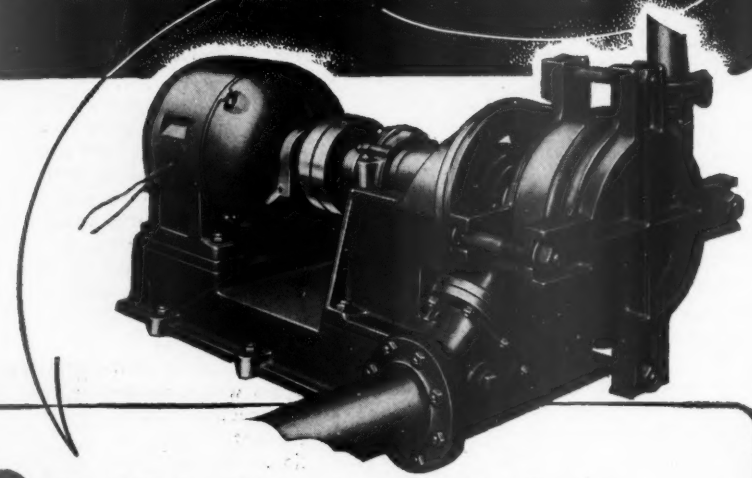
ALLEN B. BENZICK has been appointed office engineer for the Portland Cement Association at Minneapolis, Minn., with offices in the Northwestern Bank Building.

RAYMOND A. MATTHEWS of Baltimore, Md., has been named president of the Kentucky Stone Company of Louisville, Ky., by the firm's board of directors. He succeeds WILEY BRYAN, who has served as interim president since the death of SAM PARKE BURNAM several months ago.

Mr. Matthews was formerly vice-president of the Arundel Corporation of Baltimore and held an executive position with the Richmond Sand & Gravel Company, a subsidiary of the former corporation.

Only the New Morris Type "R" Slurry Pump has these

3 EXCLUSIVE FEATURES



1. ***Gland Under Suction Pressure Only. Absolute Minimum of Packing Troubles.***
2. ***Easily Dismantled By Removing Only 4 Bolts.***
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Every feature of the *new* Morris Type "R" slurry pump is designed to meet specifically the requirements of your Cement Mill. It has no internal studs or bolts. No troublesome internal joints and fits. Minimum packing maintenance.

It overcomes uncertainty of proper hub-sealing water pressures. Handles maximum suction lifts and almost unlimited positive suction heads.

It has clamping effect of bolts and discs so that the shell is not subject to high stress; consequently, it can be made from variety of materials with high abrasive resistance though not necessarily of high strength.

It has a shell which is interchangeable for right or left hand rotation. Suction and discharge nozzles can be rotated around axis of pump to positions in any of four quadrants . . . a total of 72 possible combinations.

It has low velocity in suction chamber. This reduces scouring action . . . increases life of chamber which is a replaceable casting not integral with bearing frame. Worn clearances on suction side of impeller are easily closed by four adjusting screws.

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It took 80 years' experience with material-handling pumps . . . constant practical testing in the field . . . and advanced engineering skill to develop the exclusive Morris Type "R" slurry pump. There is no other like it for your cement mill operations.

It will do your particular job at less cost . . . with less trouble . . . with longer service.

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CENTRIFUGAL PUMPS

ERNEST V. HAINES has been appointed head of the newly-formed patent department of the International Minerals and Chemical Corporation. He will work at the firm's Chicago offices under Dr. Paul D. V. Manning, vice-president in charge of the research division.

OBITUARIES

We regret that detailed information on the life and career of E. J. KRAUSE, former president of the Columbia Quarry Company of St. Louis, was not available in time for a full account in our October issue. (See page 59 of that issue.)

Mr. Krause died on September 31, 1946, at the age of 75 years. He was born in Chicago, but went to St. Louis in his boyhood. He had been president of the Columbia Quarry Company since its organization in September, 1906. In July of this year the firm celebrated his 40th anniversary as its president.

Among the many honors conferred upon Mr. Krause were the presidency of the National Crushed Stone Association, the Midwest Agricultural Limestone Institute and the Columbia & Millstadt Railroad Company. He was also a member of the N. C. S. A. board of directors and that of the Agricultural Limestone Division of the National Crushed Stone Association. Two of his sons, H. C. Krause (president) and C. H. Krause (vice-president), are actively engaged in operating the firm founded by their father.

CONRAD C. MILLER, 50, purchasing agent of the Penn-Dixie Cement Corporation from 1917 to 1945, died at his home in Nazareth, Pa., on October 13, after an illness of three months. His father, John A. Miller, Sr., the founder of the company, retired as president and chairman of the board last year.

WILLIAM A. GODSHALL, 50, a director and vice-president of the Blue Diamond Corporation of Los Angeles, died on October 27 in that city. In addition to his affiliation of 26 years with the Blue Diamond organization, Mr. Godshall was interested in several mining operations in western Arizona and was associated with a number of housing projects for war workers and veterans of World War II. He was president of the Overland Housing Corporation.

ROBERT C. MERCER, 44, an employee of the Southern Quarries Company of Columbus, O., was killed in an accident which occurred while he was operating a roller for the company. He fell from the seat of the roller and was fatally injured when it passed over his head.

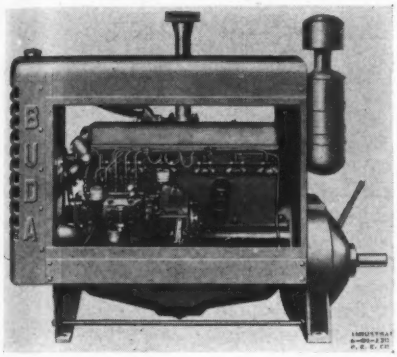
CHARLES N. MCNULTY, a member of the staff of Texas Gulf Sulphur Company of New York City, died at a Long Island hospital on September 6. He had been ill for several months.

WALTER G. HELLER, 52, president of the Heller Stone Company of Bluffton, Ind., died on October 9 of a heart attack.

NEW MACHINERY and SUPPLIES

● New Engine Series

The "BD" and "B" series of diesel and gasoline engines has been announced by The Buda Company, Harvey, Ill. These engines cover a complete range of power from 5 hp., single-cylinder diesel to 60 hp., 6-cylinder diesel (illustrated), and to 80 hp. in a 6-cylinder gasoline model. The series is designed to allow parts to be interchanged between both gasoline and diesel engines for 1-, 2-, 4- and 6-cylinder models. The engines are easy and simple to service, compact and light in weight, and have horsepower



60-hp., 6-cylinder diesel.

ratings that are consistent with those of larger model engines of the same basic design.

The 6 BD 230 model is a 230-cu.-in. displacement engine with a performance range of 28.5 hp. at 1,000 r.p.m., to 60 hp. at 2,400 r.p.m. The engine features the Buda slow-compression system, which delivers a steady push on the piston, thus providing a longer effective power stroke and causing less wear and tear on engine parts than is encountered with the hammer blow effect of rapid high pressure combustion. Lubrication is by a positive feed oil pump located in a sump in the crankcase.

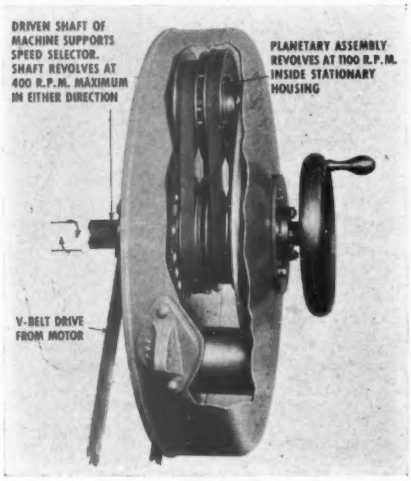
● Washer for Nonmetallics

The improved Allis-Chalmers "Log Washer" is recommended by the manufacturer as particularly suited for medium-sized materials containing a moderate percentage of clays or other contaminents. It is built in several sizes and lengths to meet capacity and duty requirements for specific applications. Normally the maximum size material that can be fed to the washer is up to 3-inch ring size. In operation, the sand, silt and clay content of the material on the washer decreases as the rock moves up the slope of the machine to overflow with the excess water. Clear water may be sprayed on at the top to aid washing. Clean, washed rock is discharged at the high end.

Revolving cutless rubber bearings and integral washer-drive construction are outstanding features of the modified machine. Particles of silt and sand tend to be depressed into the rubber far enough to avoid scoring or wear, and are then rolled by the rotation of the bearing into one of the longitudinal grooves, whence they are carried away by the clear water admitted under pressure to flush or lubricate the bearings. The washer is of all-welded steel construction, with cut steel gears. The washer and drive are mounted on one base for economy in installation, power and maintenance. Log speed, it is claimed, can quickly be varied to suit the needs of the operator.

● Speed Control

A V-belt speed control, known as the "Variable-V-Planetary Speed Selector," will be merchandised by the B. F. Goodrich Company.


DRIVEN SHAFT OF MACHINE SUPPORTS SPEED SELECTOR. SHAFT REVOLVES AT 400 R.P.M. MAXIMUM IN EITHER DIRECTION
PLANETARY ASSEMBLY REVOLVES AT 1100 R.P.M. INSIDE STATIONARY HOUSING
V-BELT DRIVE FROM MOTOR

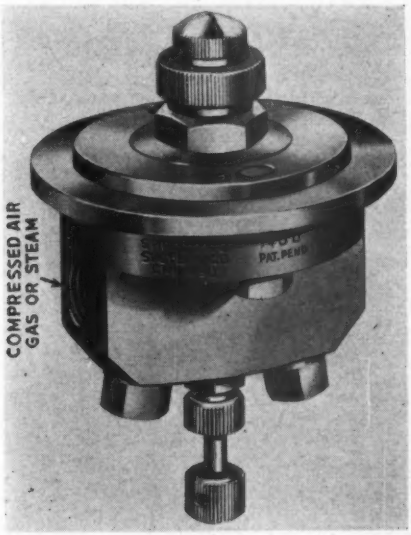
Uses V-belts.

This new development of planetary motion, in which two standard cross-section V-belts and four variable pitch pulleys provide infinite ratio stepless speed from full down through zero and into full reverse, was designed and developed by Speed Selector, Inc., of Cleveland. The control will deliver a constant 2 hp. torque throughout its speed range.

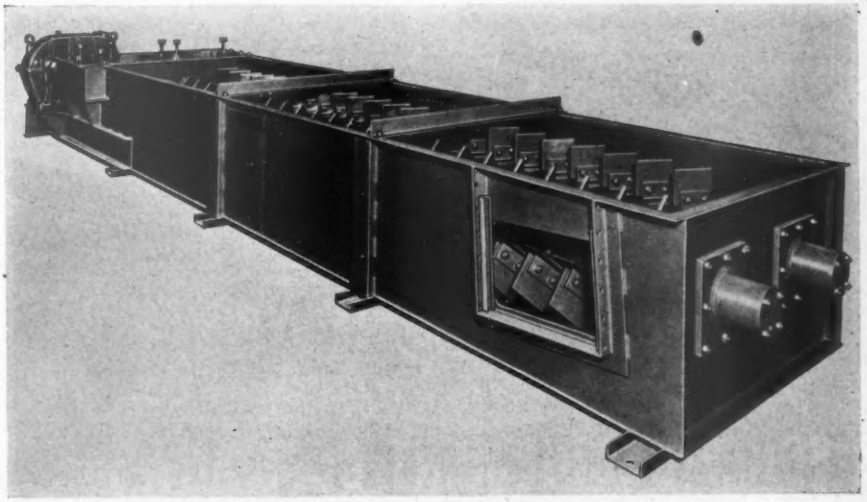
In operation, the Speed Selector system compares the ratios of two V-belt drives and applies the difference in speed to output shafts. A slight change in the variable pitch pulleys of the unit brings about a considerable change in output speed through the multiplying action of the planetary. All speed changes are made by a hand control wheel, which alters the pitch diameter of the center pulleys so that as one is increased, the other is decreased. The change is imparted to the outer pulleys by the wedging action of the V-belts. The wheel thus controls the diameter of all four pulleys, covering the complete speed range in four and one-half turns. Speeds from 400 r.p.m. to zero, forward and reverse, can be obtained.

● Spraying Nozzle

Water oil (or liquids with similar viscosity) may be atomized pneumatically through the use of a new nozzle



Sprays liquids.



Washes up to 3-inch ring size.

AVAILABLE...AN UNTIRING WORKER THAT WILL MAKE MONEY FOR ANY OPERATOR

APPLICATION FOR EMPLOYMENT

NAME SECO VIBRATING SCREEN

ADDRESS SCREEN EQUIPMENT CO., INC., BUFFALO, NEW YORK

AGE

BRAND NEW — Has hundreds of famous brothers working in various parts of the country. Some have been on the job as long as ten years.

WORK WANTED

Looking for the opportunity to increase results on all types of screening — crushed stone, concrete block aggregates, slag, ag. lime, sand and gravel.

EXPERIENCE

Comes from the SECO FAMILY of vibrating screens — famous for smooth operation year after year. The only screens with positively controlled true circular action which eliminates bobbing — weaving and puts every inch of screen to work!

REFERENCES

Members of SECO family of vibrating screens now employed and delivering dependable service for operators coast to coast.

Write Today for Complete Information!

SCREEN EQUIPMENT COMPANY, Inc.

9 LAFAYETTE AVENUE BUFFALO 13, NEW YORK

being produced by the Spraying Systems Co., 4021-N West Lake St., Chisago 24, Ill. Air, gas or steam pressure may be used with this nozzle, which is available in stainless steel or white plated brass.

To prevent clogging of the orifice, core assemblies with fine mesh monel metal screens are installed in both the air and liquid intake chambers of the nozzle body. The screens are removable for cleaning. A removable mounting flange is a part of the assembly and is held to the body of the device by two bolts. When the unit is to be installed, theh flange is removed from the nozzle and mounted on the equipment. After the flange is positioned, the nozzle is bolted to the flange.

● Industrial V Belt

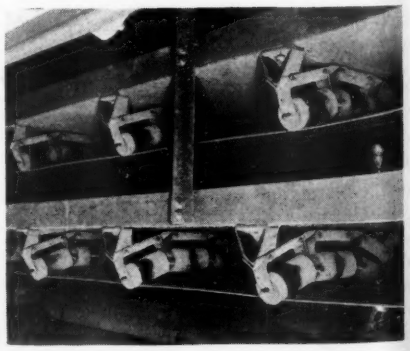
The Quaker Rubber Corporation, Comly and Milnor Sts., Philadelphia 24, Pa., have announced that they have added Industrial V-belts to their line of rubber products.

Quaker claims that these belts will incorporate several special features. Flexibility, an important factor in an industrial V-belt, will be stressed in the new product, as well as high resistance to heat and abrasion. The new belts will be well balanced, to insure true running, and will be made on all new equipment in the Quaker plant.

True-running V-belt

● Double Duty Conveyor

The two-way Stephens-Adamson belt conveyor shown is one of a number of similar installations in which one conveyor is arranged to do double duty. It was engineered by the Stephens-Adamson Mfg. Co. of Aurora, Ill.



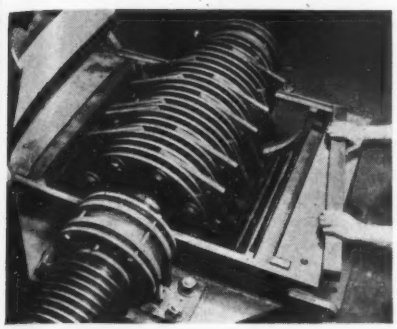
Uses return belt

The return belt is supported on troughed carriers instead of the usual flat return idlers. Since the material

is carried on what is usually the under surface of the belt, it is not advisable to handle sharp-cornered or abrasive material. The top run is discharged as usual, but the lower run must be discharged by a plow or tripper.

• Hammer Mill

The addition of a new, heavy-duty model Buffalo Hammer Mill to a well-graduated line of 16 standard types has been announced by the Buffalo Hammer Mill Corporation, 27 Washington St., Buffalo 3, N. Y. This new model Hammer



Revolving steel hammers.

Mill has an overall height of 47 inches, and is typical of the other Buffalo Hammer Mills which are used for grinding, pulverizing and crushing various materials. Buffalo Hammer Mills break up all sizes of material by shattering blows of several batteries of hardened steel hammers revolving at 1000 to 7500 r.p.m. Material is hit while suspended in mid air to eliminate the generating of heat from the friction of rubbing and crushing actions. With the elimination of heat, less power is required, and less wear and fewer breakdowns can be expected.

This new model is protected by a built-in trap which extracts foreign substances after they enter the mills.

Material may be discharged two ways, by gravity from the bottom of the machine, or by conveying pneumatically to a collection system. Special as well as standard models are made to meet all applications. Buffalo Hammer Mills are available from ½ to 200 hp. capacity.

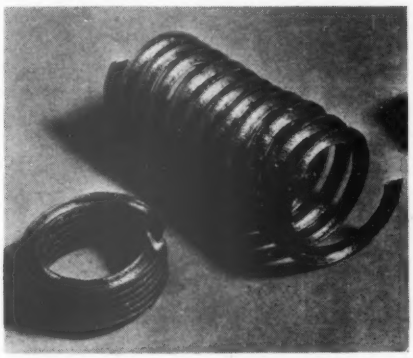
• Belt Idler

The "Rex Roller-Bearing Style No. 55RC Rubber Covered Spiral Return Idler," a product of the Chain Belt Company, is intended to combat many of the common difficulties experienced in the use of return idlers under extreme conditions. The device is a flat-bar steel helical spiral, covered with rubber and permanently welded to the bearing tube on a standard assembly. The spiral itself is composed of right- and left-hand sections to insure centering the belt. Thus, there is no tendency for the belt to drift laterally.

The rubber which covers the spiral is an extruded product, which is opened up and snapped over the bar. The natural tension of the rubber, increased by twisting in following the spiral, holds it in place. In addition, each end is securely clamped. Ice formation on the roll in freezing weather tends to be retarded because of the rubber-to-rubber contact and the ever-changing point of contact between the belt and spiral.

• Asbestos Packing

Raybestos-Manhattan, Inc., has added a new item to its packing line, a high-pressure dual-edge asbestos packing. This is a V-shaped packing for steam or air rods, valve stems, boiler feed



Supplies automatic sealing.

plungers, hydraulic rams and similar applications. It is made from woven asbestos cloth, frictioned with high-heat-resisting compound. The V shape provides automatic sealing of high or low pressure, with little surface friction on the pressure stroke and no friction on the suction stroke.

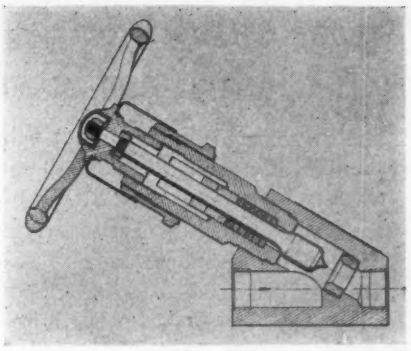
• Welding Electrode

The Stoody extrusion coated self-hardening electrode, sold by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., works equally well with either an a.-c. or d.-c. machine, within a wide range of amperages. The new extruded coating has but little tendency to pick up moisture, and is said to be uniform.

Typical applications of the new electrode include hard facing in building up worn areas of tractor lugs, shovel teeth, spindles, bulldozer blades and maganese-steel crushing equipment.

• New Valve Series

A new series of valves, "V" and "VL," have been introduced by the Grove Regulator Company of Oakland, Calif. The 30-degree valve body design tends to effect minimum change in the direction of flow through the valve and to reduce turbulence. A solid one-piece stem and plug is employed to effect the shut-off. In order to lessen the possibility of distorting or bending the stem, the valve stem is not directly carried by the handwheel. All shocks are absorbed by a multiple, full-threaded section of the handwheel and yoke; and all threaded surfaces and operating parts are protected by an encasing cap and shield.



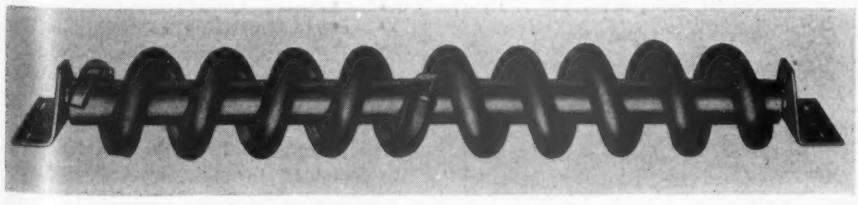
Reduces turbulence.

• Electronic Regulator

An electronic feed regulator for hammermills, attrition mills and cutters is now being marketed by Max Mosher, 130 West 42nd Street, New York City. The Mosher Automatic Control is a virtual robot operator. By means of standard

types of radio tubes and simple relays it controls the feeder motor for the steady feeding of pulverizing machinery, in strict accordance with the capacity of that machinery, regardless of material variations and other changing conditions.

Colored lights on the control panel indicate exact operating conditions at all times. These lights warn instantly of overloading, underloading, failure of grinder to discharge, no-load, empty bin and arching over. Instant automatic corrective efforts are made by the control. This device is built to take care of any pulverizing equipment up to 250 hp. on the grinder motor, and up to about 5 hp. on the feeder motor. Special models can be built to order to meet unusual requirements. Remote warning systems are available.



Rubber-covered spiral conveyor belt idler.

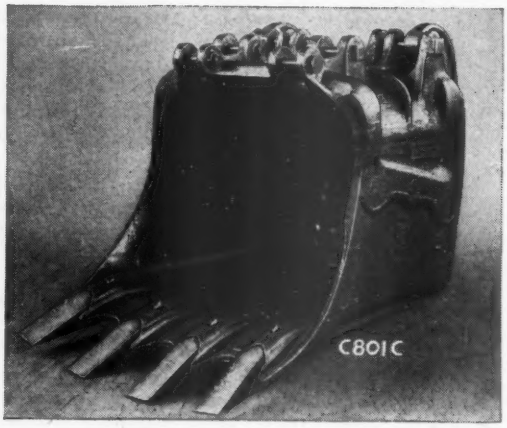
Less Weight with Ample Strength — in All-Manganese Steel Welded Type Dipper

To meet demands for a dipper with optimum durability and minimum overall weight the Amsco All-Manganese Steel Welded Type Dipper has been developed and thoroughly service-tested. These dippers have stood up staunchly in such rugged applications as steel slag recovery, iron ore mining and handling coral rock.

Design, in a dipper, affects durability, but the use of austenitic manganese steel, "the toughest steel known," as the sole material of construction in these dippers, except for small complementary parts, assures maximum resistance to impact and wear.

The important factors of design in a power shovel dipper are those which contribute to faster, more efficient digging, full loading, with maximum proportion of power consumption applied to payload, quick dumping and longer life. All these characteristics are embodied in the Amsco All-Manganese Steel Welded Type Dipper.

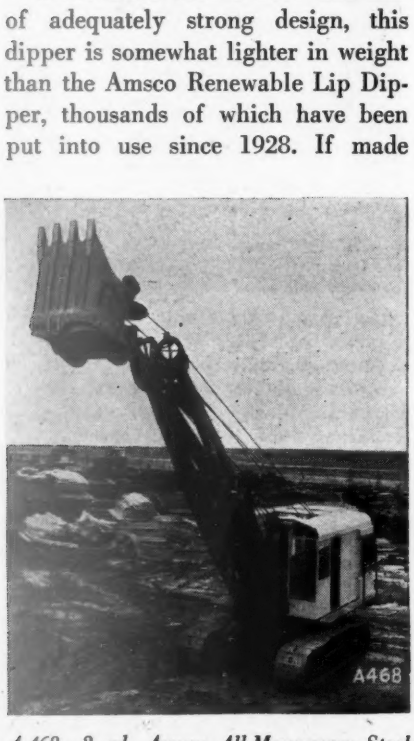
When fitted with a door and bail of adequately strong design, this dipper is somewhat lighter in weight than the Amsco Renewable Lip Dipper, thousands of which have been put into use since 1928. If made with a lightly constructed door and hinges, as generally used in light weight dippers, it will not exceed the weight of any composite-type fabricated dipper that is sufficiently strong to do a good job. The dippers illustrated have the advantage of a manganese steel body welded into an operating unit. The body is as strong and homogeneous as if made in one piece. At the same time it is possible to remove a worn front and weld on a new one without destroying the back.



C-801C. Amsco All-Manganese Steel Welded Type Dipper (Patented)

The Amsco All-Manganese Steel Welded Type Dipper is made in capacities of ¾ yd. and up. Sizes ¾ to 2 yd. are made in two body pieces; front and back. Sizes over 2 yd. are made in four pieces; front, back and two side plates. Write for full information.

Joliette Steel Limited, Joliette, Quebec, owned by American Brake Shoe Company, produces and sells Amsco Manganese Steel Castings in Canada.

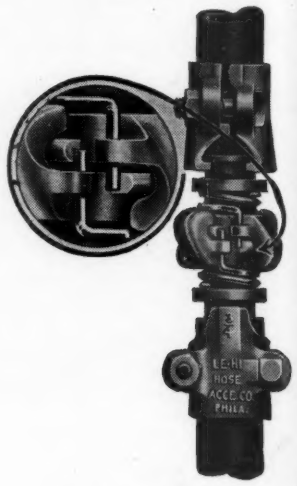


A-468. 2 yd. Amsco All-Manganese Steel Welded Type Dipper on Lorain "82" shovel; used for handling coral rock in New Guinea.

AMSCO
Foundries at
Chicago Heights, Ill.; New Castle, Del.;
Denver, Colo.; Oakland, Calif.;
Los Angeles, Calif.; St. Louis, Mo.
Offices In Principal Cities
AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS • ILLINOIS
AMERICAN Brake Shoe COMPANY

● Hose Coupling

The Le-Hi Series 150-B, a new universal-type hose coupling, has a built-in safety locking feature. The device eliminates the danger of accidental uncoupling of hose lines, even under the roughest service conditions, yet permits instant coupling or uncoupling. The safety locking feature does not affect the use of the new coupling with others made to accepted standards.



Safe connection.

In coupling, locking is automatic, with the usual twist (quarter turn) coupling the hose and locking the connection. As the connection is made, a bronze alloy spring comes up, protruding beyond the face of the coupling, and locks the joint securely. To uncouple the hose, a very light thumb pressure retracts the spring, and the unit can be disconnected in the usual manner. The Series 150-B is said to be a satisfactory coupling for air, water, oil or steam hose.

● Shaft Connector

A flexible device for connecting shafts has been announced by the Brooks Equipment Corp., Hoboken, N. J. This new product, known as "Flexible Gear Turret," is designed for connecting shafts which form any angle between 0 degrees (straight line) and 95 degrees on either side of the zero angle. The arrangement of the beveled gears attached to the shafts, which are supported in "Hinged Housings," lets the shafts both oscillate and rotate.

Uses beveled gears.

TRADE NOTES

K. V. Turner

K. V. (Ken) Turner has been appointed assistant sales manager of LaPlant-Choate Manufacturing Co., Inc., of Cedar Rapids, Ia., according to a recent announcement by E. R. Galvin, executive vice-president and general sales manager.

Mr. Turner joined the LaPlant-Choate staff in 1938. Since then his experience with the company has been quite diversified. Last year he was asked to assist in organizing LaPlant-Choate's independent dealer program.

G. V. Leece, vice-president of the Gardner-Denver Company, has been appointed general sales manager for the company, effective immediately.

Mr. Leece joined the Gardner-Denver Company in 1922 and is now rounding out 24 years of service. For the past two years his position has been that of vice-president in charge of the export division, with offices in New York City.

Mr. Leece, who is also a director of Gardner-Denver Company, will now be located in the plant at Quincy, Ill. He brings to his new duties a thorough understanding of the company's widespread markets.

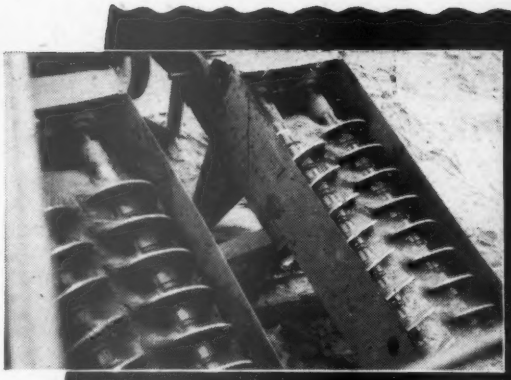
T. A. Buck

Bemis Bro. Bag Company of St. Louis, Mo., announces the appointment of T. A. Buck as sales manager of their Kansas City organization.

Mr. Buck has been associated with Bemis for more than 11 years. Most of his experience has been in the Southwest, particularly in Kansas and Texas.

Joseph T. Ryerson and Son, Inc., have announced the completion of an addition to the structural shop office building at their Chicago plant, which is an extension to the two-story steel and brick structure located at the corner of 18th and Rockwell Streets. It provides 6,500 additional square feet of floor space.

The estimating and drafting division of the structural shop department, formerly housed in the company's general offices in the main building at 16th and Rockwell Streets, is now located in remodeled quarters on the second floor of the enlarged building, directly above the shop office. The template shop occupies



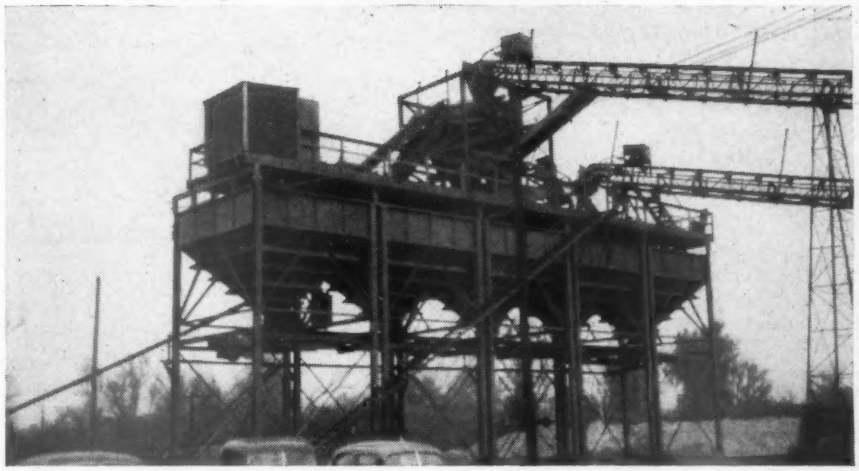
Two Eagle Twin Screw Washers

EAGLE ASSURES QUANTITY-QUALITY PRODUCTION at New Sand and Gravel Plant

Concrete Materials Co.
West Des Moines, Ia.

Eagle 30-ft. Log Washer

Main Storage



The Concrete Materials Co. selected Eagle Screw and Log Washers for their new $400,000 sand and gravel plant at West Des Moines, Ia. A complete description of the layout and operation of this plant appears in an interesting article elsewhere in this issue. Four single screw and 2 double screw Eagle washers are used (1) to recover sand and fines; (2) for washing after screening operations; and (3) in final gradation operation above storage tanks. A 30-ft. Eagle Log Washer removes clay balls from coarse gravel. Take advantage of quantity-quality production with economical, durable Eagle equipment—write for bulletin.

EAGLE IRON WORKS
133 Holcomb Ave., Des Moines, Ia.

EAGLE *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS

EAGLE IRON WORKS
DES MOINES, IOWA
"SERVING INDUSTRY FOR OVER SEVENTY YEARS"

the remaining space on the second floor. A special conference room has also been provided on this floor for the use of architects and engineers who have occasion to call at the plant.

A new and more convenient room has been provided in the remodeled first floor shop office to accommodate visiting inspectors. The remainder of the first floor is given over to locker and washroom facilities and a tool and supply room.

R. D. Evans

Robert D. Evans has joined the sales development division of Caterpillar Tractor Company as civil engineer consultant on earthmoving equipment and its applications. Mr. Evans comes to "Caterpillar" from R. G. LeTourneau, Inc., where he functioned as chief field engineer. During his employment there, he traveled throughout the United States and Canada consulting with dealers and contractors on earthmoving equipment applications. During World War II Mr. Evans acted as liaison between the Corps of Engineers, U. S. Army, and LeTourneau.

Effective as of November 1, 1946, L. J. Renner became mid-continent wire rope sales manager for the Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation. Mr. Renner will be located at 1502 Fort Worth National Bank Bldg., Fort Worth 2, Tex.

A. C. Carpenter, director of the Bemis Bro. Bag Co. of St. Louis, passed away on November 5, at the age of 77 years. He was associated with the Bemis Company for 50 years and for 35 years he held important executive positions. In 1942 he became first vice-president.

Early this year Mr. Carpenter retired from many of his active duties but remained as a senior counselor and director of the company, retaining his office at the Bemis headquarters in St. Louis.

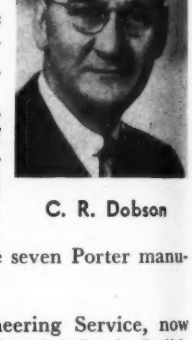
Scene at the Hartung Stone Company's quarry at Wauwatosa, Wis., showing a Lima Type 34 Paymaster shovel stripping overburden.

P. H. Desrosiers has been named executive vice-president and a director of Joliette Steel, Ltd., a subsidiary of the American Brake Shoe Company. Mr. Desrosiers had been previously associated with Joliette, but was employed from 1932 until recently by the Sorel Steel Foundries, Ltd., of Canada.

In an address delivered recently in Chicago by W. C. Schumacher, general manager of the International Harvester Company's motor truck division, an explanation was given for the failure of the industry to reach production goals set for 1946. Mr. Schumacher stated that strikes in the steel and coal industries and in suppliers' plants constituted the main reason for the deficiency of production. He declared that the August, 1946, production schedule, which called for 14,200 units, had to be cut to 11,800 because of strikes among parts suppliers.

C. H. Porter has been appointed manager of industrial, wholesaler and contractor sales of the Anaconda Wire & Cable Company of New York.

He will supervise the sales and servicing of all products and endeavor to streamline and better coordinate relationship between customers, sales and production departments.



C. R. Dobson

C. R. Dobson has been elected vice-president in charge of operation, according to an announcement made by the H. K. Porter Company of Everett, Mass.

Mr. Dobson, who was formerly chief industrial engineer of the Jones and Laughlin Steel Corporation, will supervise operations of the seven Porter manufacturing plants.

The Tayler Engineering Service, now located at 2100 Industrial Bank Building, Detroit 26, recently moved its offices from the Marquette Building to take advantage of joint engineering facilities which make possible an expanded field. Its staff specializes in plant mechanization of the lime, cement, brick, crushed stone, sand and gravel and other nonmetallic industries.

• One of the charts portraying the White Motor Company's three-point Control System of Truck Management, covering the correct application of the truck, improved maintenance methods and better selection and training of drivers. The system was developed after a six-year nationwide study of all major truck-using industries. It was presented at a special preview for the heads of the trade associations held in Washington, D. C., and at the annual convention of the American Trucking Association in Chicago on October 9, 1946.

By courtesy of the White Motor Company

The Wellman Engineering Company, Cleveland, O., has announced the appointment of Asa Shiverick as district sales manager of the clamshell and dragline bucket department in the New York City territory, with offices at 2612 Graybar Building, 420 Lexington Ave., New York, N. Y.

Asa Shiverick

The Industrial Brownhoist Corporation has announced the retirement of James B. Hayden as vice-president in charge of sales, and the election of Max Riedenack to this position.

The corporation has also announced the following changes in their sales organization: H. D. Wright, director of sales on the Eastern seaboard, with headquarters in New York City; C. H. White, director of sales in the South and West, with headquarters in Chicago; A. P. Lyvers, district sales manager of the Chicago office; Stanley See, district sales manager of the Philadelphia office.

John W. Adelung, formerly New York and New England regional director of the Office of Defense Transportation, has been appointed district manager of the White Plains, N. Y., branch of the Mack International Motor Truck Corporation.

Richard F. Muller has been named manager of the New Orleans district office of the Allis-Chalmers Manufacturing Company, succeeding F. W. Stevens, who requested to be released from this responsibility, after 41 years of service with the company. Mr. Stevens has been district manager at New Orleans since 1912.

The Los Angeles and San Francisco offices of the Nordberg Manufacturing Company of Milwaukee have been consolidated in a new building and warehouse at 674 Harrison Street, San Francisco.

No change has been made in the personnel of the two offices. C. G. Cox, Pacific coast manager, and George Lienhard, installation and service engineer of the heavy machinery division, will have their headquarters in the new building, together with T. D. Davis, district manager for the crusher and process machinery divisions.

Dr. John V. N. Dorr, of the Dorr Company, accompanied by his grandson, Burr Hardon, recently discharged from the Marines, have returned from a five weeks' tour of Europe. During this time they visited Germany on a special mission for F.I.A.T. (Field Intelligence Agency Technical). They were accompanied by Dr. Anthony J. Fischer, who recently completed a special investigation on sewage treatment development in that country, for the same agency.

Thomas A. De Marco, formerly with United Aircraft Products Corporation, has been named executive assistant to John J. Bergen, chairman of the board of Gar Wood Industries, Inc., with headquarters in New York.

T. A. De Marco

Mr. De Marco served as an Air Corps major in the office of the Assistant Chief of Air Staff, Washington, D. C., where he was in charge of contract termination and disposal of surplus property. After discharge from service, he served as consultant to the Reconstruction Finance Corporation in the disposal of surplus aircraft. Prior to World War II he was with the Chapman Valve Manufacturing Company of Springfield, Mass., and the Johns-Manville Sales Corporation.

A complete new setup in the manufacture of its diesel engines is announced by Lister-Blackstone, Inc., of Milwaukee.

All production has been moved to a modern newly-equipped plant. A departure from its past policy will be an almost complete concentration on the production of straight diesel engines. While there will be some adaptations—such as power takeoff and irrigation pump outfits and possibly marine propulsion units —no diesel generator sets or combina-

Those three important factors build conveying efficiency and economy. They are the reason for the increasing preference for Cincinnati Conveyor Belts in aggregate plants everywhere. Remember you handle aggregate better if you have "CINCINNATI" on the job.

THE CINCINNATI RUBBER MFG. CO.
CINCINNATI 12, OHIO

CINCINNATI CONVEYOR BELTS

PULVERIZERS

Hundreds of Installations . . Use Bradley Pulverizers

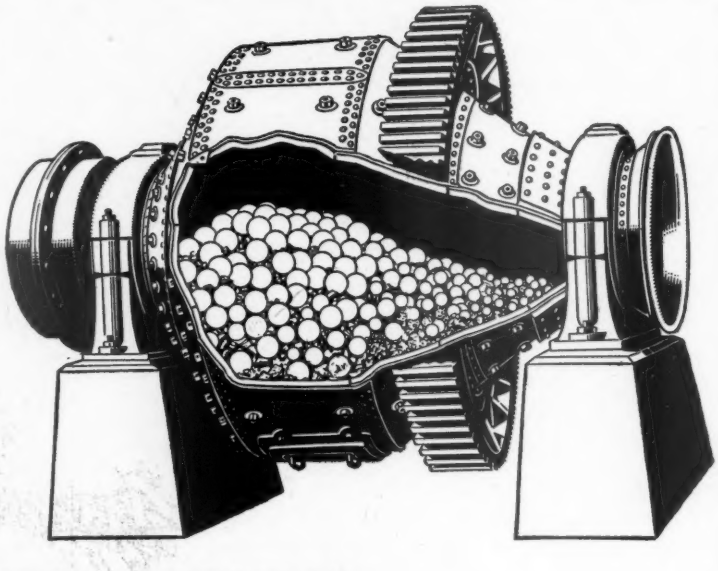
for the reduction of

AGRICULTURAL LIMESTONE
Cement Materials and all
Dry, Non-Metallic Minerals

CAPACITIES: 1 TO 50 TONS PER HOUR
FINENESSES: 20 TO 350 MESH

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.



NATURAL SELECTION

without clogging at the discharge end
is another feature of dependable

HARDINGE CONICAL MILLS

This cross-sectional view of a Hardinge Conical Ball Mill shows how the conical shape of the Mill causes a *natural* selective arrangement of the grinding media. The results are: energy proportioned to required work, lower power consumption per ton, more accurate grinding, and lower maintenance expense due to rugged construction. *Catalog 13-D tells the whole story: request it.*

HARDINGE

COMPANY INCORPORATED

YORK, PENNSYLVANIA — 240 Arch St. • Main Office and Works
NEW YORK 17—122 E. 42nd St. • 205 W. Wacker Drive—CHICAGO 6
SAN FRANCISCO 5—501 Howard St. • 200 Bay St.—TORONTO ?

tion auxiliaries will be produced.

All business will be transacted from a new, downtown office at 740 N. Plankinton Avenue, Milwaukee 3, Wisconsin.

Carl W. Meyers, president of The Colorado Fuel and Iron Corporation, announces two appointments.

Howard J. Jones, has been made manager of industrial relations. For the last 12 years he was associated with the Republic Steel Corporation in a similar capacity. He will head a progressive program of industrial relations.

Horace J. Jones was named manager of industrial engineering. His comprehensive knowledge of this highly important work was gained through 29 years of practical experience with his former connection, the Republic Steel Corporation.

L. W. Beck

The appointment of Leonard W. Beck as acting general sales manager of the Cummins Engine Company, Inc., was announced by R. E. Huthsteiner, vice-president, assistant general manager and controller. Mr. Beck's new responsibilities will be the overall administration of the Distribution Division (Sales and Service).

While Mr. Beck also will continue as manager of the company's Central Region, his offices will be at the factory in Columbus, Indiana.

A new company, Tractomotive Corporation, has been formed to manufacture equipment for industrial wheel and crawler tractors. V. M. Dobeus, formerly chief engineer, Springfield Works, Tractor Division of the Allis-Chalmers Manufacturing Company, is president. Paul B. Cochran, formerly general manager of Buckeye Traction Ditcher Company, is vice-president and treasurer. Both men have spent their entire business lives in the construction industry. Company headquarters are at 228 North La Salle Street, Chicago. The plant and engineering department are now operating at Findlay, O., with offices at 101 West Sandusky Street.

Clifford A. Sharpe has been elected vice-president in charge of manufacturing of Gar Wood Industries, Inc., it was announced today by John J. Bergen, chairman of the board.

Mr. Sharpe will supervise Gar Wood's manufacturing operations in Detroit, Wayne and Marysville, Mich.; Mattoon, Ill.; Findlay, O.; Newport News, Va., and St. Paul, Minn.

J. E. Brown has been appointed manager of the Philadelphia branch of Gar Wood at Kensington and Sedgley Avenues, in charge of the products of the hoist and body, winch and crane, and tank divisions. Mr. Brown was associated for a number of years with Gar Wood's Chicago branch in a sales capacity.

R. G. LeTourneau, Inc. of Peoria, Illinois, has announced several important personnel changes in its General Sales Division. Wendell Richards, district sales representative in Pittsburgh, Philadelphia

Cloyd Richards

O. A. Williams

and Baltimore, has been promoted to the post of market research manager, a position vacant for the past few months.

Cloyd Richards, assistant service manager, has been named general service manager to succeed C. F. Zimmerman, who recently transferred to the sales field.

O. A. "Jack" Williams has been appointed Eastern sales manager to succeed Harry Conn, who resigned. He has been district sales representative in Ohio, Indiana and Michigan for the past three years.

George P. Torrence, executive vice-president of Link-Belt Company since July 1, 1946, became the president of the company, effective, November 1, succeeding William C. Carter.

Mr. Carter, who had been president since December, 1942, retired from this position in accordance with the company's retirement plan. He continues as a director of the company and as chairman of the executive committee of the board. He will also serve as a consultant to the company.

LeTourneau's Eastern sales office, in charge of O. A. Williams, has been moved to 1026 17th Street, N. W., 412-413 Defense Building, Washington 6, D. C.

Mr. Williams was named to the eastern sales managership this fall after serving LeTourneau as a district sales representative in 1944. Also at the Washington office is Henry Cain, who comes to LeTourneau as assistant to Mr. Williams after five years' service in World War II.

W. B. (Bill) Worden, district sales and service representative for LeTourneau in southern California and Arizona for the past four years, has been named central sales manager. He succeeds M. E. (Cap) Miller, who resigned to become sales manager for the Rozier-Ryan Company, LeTourneau distributor in St. Louis, Missouri.

LeTourneau also announces the recent appointment of Harold F. Stenstrom as district sales representative, with headquarters at Memphis, Tenn. He is serving LeTourneau distributors in Missouri, Tennessee, Arkansas, Louisiana and Mississippi.

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LONDON, EC2, ENGLAND: Salisbury House
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DOUBLE IMPELLER BREAKERS

Legal Decisions

By LEO T. PARKER
Attorney at Law
Cincinnati, Ohio

Quite recently a higher court rendered an important decision in which it stated that employers who have little or no knowledge of elementary law cannot expect to win favorable verdicts in a majority of suits. This is so, no doubt.

Therefore, we shall review several outstanding higher court decisions selected because of their adaptability to impart legal knowledge that will enable readers to conduct their business in view of winning unavoidable law suits.

Must Pay for Services

Considerable discussion has arisen from time to time over the legal question: If a contractor performs services for another person who makes no promise to pay for such services, can the contractor recover payment?

For illustration, in *Western Asphalt Company v. Valle Company,* 171 Pac. (2d) 159, reported September, 1946, it was shown that the Valle Company, in anticipation of getting a large contract to construct a government project, notified the Western Asphalt Company, which furnished its engineering services in computing costs relating to asphalt payment and soil stabilization portions of the general contract. According to the testimony, the asphalt company often had made estimates of construction costs for the Valle Company in anticipation of receiving a subcontract to perform the asphalt work. And in past instances the asphalt company had not charged any general contractor for these services.

The Valle Company submitted a bid on the government project for $1,996,000 and was awarded the contract because it submitted the lowest bid. The Western Asphalt Company sued the Valle Company for $43,000 for its services rendered.

The Valle Company contended that it could not be held liable because, first, in the past the asphalt company had rendered services without expectation of compensation, except when it received the subcontracts for the installation of asphalt paving when the general contractor to whom it had furnished data had been awarded the contract for the entire job; and, second, there was no agreement or promise that the asphalt company should receive pay for the services rendered when computing costs relating to the asphalt pavement and soil stabilization.

Although the jury refused to render a verdict in favor of the Western Asphalt Company, the higher court reversed the verdict, and said:

"It is not necessary that the defendant (Valle Company) should have believed that the plaintiff (Western Asphalt Company) expected pay. . . . Where services of a beneficial character are performed by one for another with the latter's express or implied assent, or upon his request, a promise to pay will be *implied* if the circumstances were such as to . . raise a presumption that compensation was expected."

No Damages

According to a late higher court decision, any person may *without any* liability breach a valid lease, if the landlord fails to prove that he was damaged by the breach.

For example, in *Ready v. Safeway Rock Company,* 24 So. (2d) 808, reported May, 1946, it was shown that the Safeway Rock Company leased certain property for ten years from its owner. The lease contract contained a clause that within 90 days the Safeway Rock Company would erect "a plant and equipment of capacity sufficient to produce 500 tons of crushed rock per day from the leased lands."

The rock company failed to erect the plant and the property owner sued for heavy damages.

Since there was no provision in the lease for penalty or forfeiture in the event of failure of the rock company to build a plant and, also, because the property owner failed to prove that he suffered any financial loss from refusal of the rock company to construct the plant, the higher court refused to hold the rock company liable for payment of any damages. This court said:

"The record shows that the purpose of the lease was to mine phosphate rock. . . . The instant lease did not provide for a forfeiture, and he (property owner) is not shown to have been damaged in any way."

Keep Original Tickets

Sellers of sand, gravel, rock, and other nonmetallic products should keep all *original* tickets and memoranda of sale for future reference.

In *Dalbey Brothers v. Crispin,* 12 N. W. (2d) 277, a seller of building material filed a mechanic's lien to secure payment for materials. The property owner contended that there was no proof of delivery of the materials. However, the seller introduced before the court the original tickets. This court granted the lien, saying original tickets and memoranda of sales are admissible as evidence to support a lien claim.

Improperly Addressed Letter

Under all circumstances a notice mailed to a property owner, stating that a mechanic's lien *will be* filed, must be properly addressed.

See *Higgins Company v. Marucca,* 48 Atl. (2d) 48, reported October, 1946, where it was shown that a seller addressed an envelope to a property owner containing a notification of his intentions to file a mechanic's lien.

The seller was denied a mechanic's lien because the first name of the property owner was incorrectly spelled on the letter.

Must Prove Negligence

In all law suits involving injuries, the party being sued will *not* be held liable if the injured person fails to prove conclusively that the injury resulted from the former's negligence.

For example, in *Pierce v. Gruben,* 21 N. W. (2d) 881, reported July, 1946, it

was shown that a company sold and erected a tombstone. The purchaser was injured when he was inspecting the stone several months after its erection. He claimed that when he touched the tombstone while inspecting it, the stone fell upon him.

The company introduced witnesses who testified that freezing of water and moisture, and the thawing of ice and snow and the ground around the stone, and other action of the elements and the forces of nature, would loosen or break cement joints that were properly made when the monuments were set. Since Pierce failed to prove that employees of the company were negligent when they erected the monument, the higher court refused to hold the company liable in damages.

Warehouseman Violates Contract

According to a late higher court decision, a warehouseman who stores materials in a location *different* from the one specified in the storage contract, is liable for any and all losses of the materials.

For example, in *Gray v. Security Storage Company, Inc.,* 26 So. (2d) 399, reported September, 1946, it was shown that certain merchandise was destroyed by fire when a warehouse burned. Ordinarily the warehouseman would not have been liable if the owner of the goods failed to prove that the fire was caused by *negligence* of the warehouseman.

However, the testimony proved that without the *knowledge* of the owner of the goods the warehouseman had moved the stored goods from its original location to another place.

The higher court held the warehouseman fully liable. This court explained that where a storage company places merchandise in a location *other* than that designated in the contract of storage, the warehouse company is liable for theft, damage or loss of the goods irrespective whether the merchandise was as safe in the new location as it would have been in the place designated in the contract of storage.

Widow Receives Compensation

The general purpose and intent of the State Workmen's Compensation Act is to provide compensation for the widow and dependents of one who dies from silicosis.

For illustration, in *Jones v. New River Company,* 38 S. E. (2d) 376, reported July, 1946, it was shown that a state law provides that an employee suffering from silicosis in second degree shall receive $1,000 as compensation *in full* for the disease, and that such sum shall be a final payment.

An employee of the New River Company contracted silicosis and was awarded and paid $1,000 compensation for silicosis of the second stage. He died within one year from his last injurious exposure to silicon dioxide dust in harmful quantities, and his widow filed suit to receive further and additional compensation.

In holding in favor of the widow's receiving additional compensation, the higher court said that the claim of a widow and dependents of a deceased employee under the State Workmen's Compensation Act is a separate and distinct claim from that made by an employee in his lifetime.

Employee Works Free

It is well established law that if an employee is covered by the State Workmen's Compensation Act and he applies for compensation for an injury, he *cannot* sue the employer for damages. However, an employee *not* protected by the compensation laws may sue and recover damages from his employer for any injury resulting from negligence of the employer. According to a late higher court decision, an employee who donates his services is not a legal employee.

See *Edwards v. Hollywood,* 167 Pac. (2d) 729, reported July, 1946, where it was shown that an employee donated his services. He was severely injured. He sued the employer, but the higher court decided that the proprietor was liable to the employee for heavy damages, and said:

"Under the definition of 'employee' in workmen's compensation statutes, there must be a contract of hire or employment, and services voluntarily and gratuitously performed are not included."

The importance of this decision is apparent, because all employers are liable in *damages* for *negligent* injury to an employee, although the employee cannot recover compensation under the State Workmen's Compensation Laws.

Customer Is Injured

Considerable discussion has arisen from time to time over the legal question: If an employer furnishes a parking lot for convenience of his employees is an employee who sustains an injury on the parking lot entitled to compensation?

In *Young v. Hamilton Company,* 45 Atl. (2d) 261, it was shown that a company provided a parking lot for the use of its employees. One morning an employee slipped and fell on ice. He was seriously injured.

The higher court refused to allow the employee any compensation for the injury, saying:

"An accident, to be considered as happening on the premises of the employer, must be so connected with the business in which the employee is engaged as to form a component or integral part of it."

Independent Contractor

According to a late higher court decision, if an employer has a right to *discharge* an employee, this person is a legal employee and not an independent contractor.

See *Burnett v. Hurst Sand and Gravel Company,* 63 N. E. (2d) 240, where it was shown that an employer arranged with a truck owner to haul gravel at $2.50 per hour. The truck owner furnished his own truck, gas and oil and was to be paid weekly. He was injured and sued to recover compensation under the State Workmen's Compensation Act.

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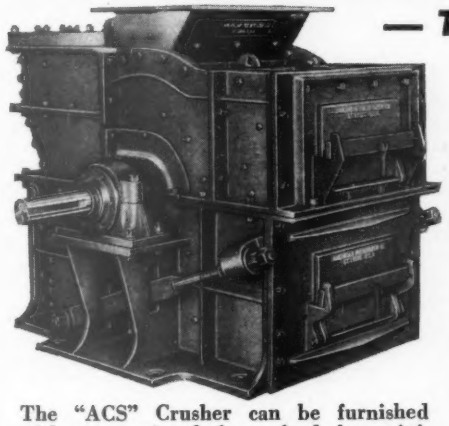

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The higher court held that the truck owner was an employee and not an independent contractor and therefore could recover compensation *because,* although the sand and gravel company paid him an hourly basis, the company officials could discharge him when they pleased.

On the other hand, if a person takes a contract to do a specific job and the employer cannot discharge him until the job is finished, such person is an independent contractor, provided that he is not under control of the employer.

Another recent higher court held that an employer is not required to pay industrial insurance, unemployment compensation, social security, and the like, on any independent contractor.

Contributory Negligence

No person may recover damages for injuries to his person or property caused by his *own* negligence.

For illustration, in *Monacelli v. State,* 67 N. E. (2d) 569, reported August, 1946, it was shown that the Hill quarry was adjoined by the Otto Squires quarry. Hill leased the latter quarry. During "marking" of it by Hill the removal of the stone extended the face of that quarry until it was brought close to the common boundary separating it from the Hill quarry. The rock formation between the Otto Squires quarry and the Hill quarry was removed in these operations. The unavoidable result of these operations was that the water which escaped from a canal owned by the state accumulated upon the Otto Squires quarry and also gathered upon the Hill quarry.

The owner of the Hill quarry sued the state to recover damages resulting from negligence of public officials in the construction and maintenance of the banks and bottom of the canal.

In holding the state not liable, the higher court said:

"Here the consequences of the claimant's (Hill's) act were obvious for he voluntarily and deliberately destroyed the barrier of rock between the two quarries, letting the water in one flow into the other. With knowledge of the unavoidable danger, he tore down the rock and voluntarily accepted the consequences, and may not recover damages which he deliberately caused to his own property."

Proof of Loss

According to a recent higher court, a shipper's record and also a bill of lading is admissible as evidence only to "indicate" the quantity of merchandise believed to have been shipped. In other words, the carrier may prove that its bill of lading containing notation "shippers load and count" is not correct.

See *Stella Company v. Chicago, St. P., M. & O. Ry. Company,* 21 N. W. (2d) 655, where the higher court held that its shipping record is admissible, under the federal Bill of Lading Act, to prove that the quantity of merchandise shipped in interstate commerce was incorrectly listed on the bill of lading.

Therefore, in order to eliminate future chances for litigations over the quantity of shipped merchandise, readers should have the carrier's agent *verify* his count.

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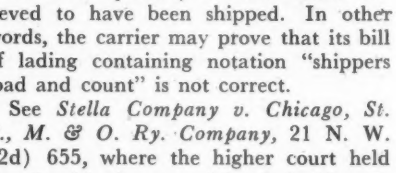

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Questions and Answers

[Mr. Parker will be glad to answer questions regarding legal problems of PIT AND QUARRY readers. Questions should be addressed to Leo T. Parker, Legal Editor, PIT AND QUARRY.—Ed.]

Legal Editor: A few weeks ago we took a contract and shipped materials to the buyer's order f.o.b. his city. These materials were lost in transit. Who is responsible and who must collect from the carrier?—F. C.

Answer: You are the consignor and must assume the responsibility of collecting the loss from the carrier. Also you must comply with your contract and immediately supply the purchaser with other undamaged materials. Modern higher courts hold that the consignor retains "legal title" to merchandise shipped f.o.b. the location of the consignee, until accepted by the latter.

If the goods had been shipped f.o.b. your city, the consignee would have been obligated to pay you the full contract price for the materials; he would be obligated to collect damages from the carrier. In this case he would have had legal title the instant the shipment was accepted from you by the carrier.

Legal Editor: I am very much interested in establishing the ownership of a gravel deposit in the——River on the (State) side that previous to the installation of locks and dams in the river was above low-water level. This deposit is situated along a disannexed plot of ground, and the ground itself never has been incorporated and probably never will be. The city attorney is of the opinion that this sand-and-gravel deposit belongs to the city as it is a disannexed part of the city even though adjacent land is owned by individuals. —O. V. C.

Answer: In examining the late higher-court cases on the subject of law in which you are interested, I find one, namely, U. S. 143 Fed. (2d) 720. In this case the federal court held that the dominant power of the United States extends to the entire "bed" of a stream such as the——River. This included land below the ordinary high-water mark. No compensation is payable to property owners for invasion of rights with respect to this part of the river bed. Also, in Fowler, 17S.W. (2d) 250, the higher court held a state law void which reserved to the state the ownership of sand and gravel lying within the bed of any navigable stream. And, again, in State, 180 S.W. (2d) 144, the higher court clearly held that where, through erosion, a navigable stream cuts its banks and forms a new bed, the owner of the latter land forfeits his right of ownership to it. In other words, ownership is not changed by the dislocation of a navigable stream, according to this decision. Thus, it seems that the fact that the land is in the river bed because of the dams would not change the ownership except that the part under water will be within control of the United States. Of course, this law may be changed or varied by different courts.

TRAFFIC News Digest

CENTRAL FREIGHT ASSOCIATION DOCKET

Docket 81582 (2)—Sand, (except blast, core, engine, foundry, glass, moulding or silica) and gravel, carload in open-top cars, minimum 90 percent of marked capacity of car, except that when loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Urbana, O., to Fremont, O., 116 cents, to Sandusky, O., and Graytown, O., 127 cents per net ton, subject to ExParte 147-162 increase.

Docket 81663 (2)—Stone fluxing, furnace or foundry, melting or refractory, unburned, in bulk, in open-top cars, carload minimum weight 90 percent of marked capacity of car, except that when cars are loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Hillsville, Walford and Shaw Junction, Pa., to Harriet and North Tonawanda, N. Y., 179 cents per gross ton, subject to ExParte 148.

Docket 81672 (2)—Cement, masonry cement, mortar cement, dry building mortar, as described in Item 5 of the tariff. Amend Central Freight Association Lime tariff 449-G, publishing rates on, from stations in Illinois, Indiana, Iowa, Missouri, Ohio, Pennsylvania and Wisconsin to stations in S.F.A. territory, by providing for the elimination of the expiration date of December 31, 1946, at present applicable in connection with rates from Central Freight Association origins to Carrollton, Ky.

Docket 81680 (1)—Stone, crushed, having value for construction purposes only and not suitable for agricultural or chemical purposes, in bulk, in open-top cars, carload minimum weight 90 percent of the marked capacity of the car used. Establish on, from Melvin, O., to N.&W. Railroad stations in West Virginia, viz.; Kenova, 160 cents; Hubbardstown, 165 cents; Millet, 176 cents; Borderland, 187 cents; Cedar, 198 cents; Roderfield, 209 cents; and Welch, 220 cents per net ton, subject to Ex Parte 148-162.

Docket 81681 (1)—Stone, crushed, having value for construction purposes only and not suitable for agricultural or chemical purposes, in bulk in open-top cars, carload minimum weight 90 percent of marked capacity of the car used. Establish on, from Melvin, O., to C.&O. Railroad stations in West Virginia, viz.: Midkiff, 176 cents; Chapmanville, 187 cents; Logan, Man, Wylo, 198 cents; W. Gilbert, 209 cents per net ton, subject to Ex Parte 148-162.

Docket 81693 (2)—Sand (except blast, core, filter, fire or furnace, foundry, glass, grinding, or polishing, loam, moulding or silica), or gravel, in open-top cars, carload minimum weight 90 percent of marked capacity of car, except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Kise, Ky., to points on the B.&O. Railroad, N.Y.C. Railroad and West Maryland Railroad, representative rates as shown in Exhibit C. (Not shown.) Proposed rates subject to Ex Parte 148-162 increase.

Docket 81696 (2)—Limestone, agricultural, unburned, in open-top cars, carload, minimum weight 90 percent of marked capacity of car, except that when cars are loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Perkins, Ind., to stations in Illinois on the Pennsylvania and Wabash railroads, rates as shown in Exhibit D.

EXHIBIT D

Rates in Cents Per Net Ton

	Proposed Rate
Paris, Ill.	116
Redmond, Borton, Oakland, Hindsboro, Arcola, Chesterville, Arthur, Williamsburg, Marshall, Sadorus, Sloan, Ivesdale, Bement, Sulu, Monticello, Lodge, Ill.	121
Lovington, Decatur, Martinsville, Cushman, Sullivan, Ill.	127
Casey, Greenup, Jewett, Ill.	132
Montrose, Teutopolis, Effingham, Dexter, Altamont, Ill.	138
St. Elmo, Ill.	143
Danville, Tilton, Catlin, Ill.	99
Ryan, Fairmont, Ill.	105
Homer, Sidney, Ill.	110
Philo, Tolono, Ill.	116
Voorhies, Hammond, Ill.	124

Docket 81724 (2)—Stone, crushed, having value for construction purposes only and not suitable for agricultural or chemical purposes, in bulk in open-top cars, carload minimum weight 90 percent of marked capacity of the car used. Estab-

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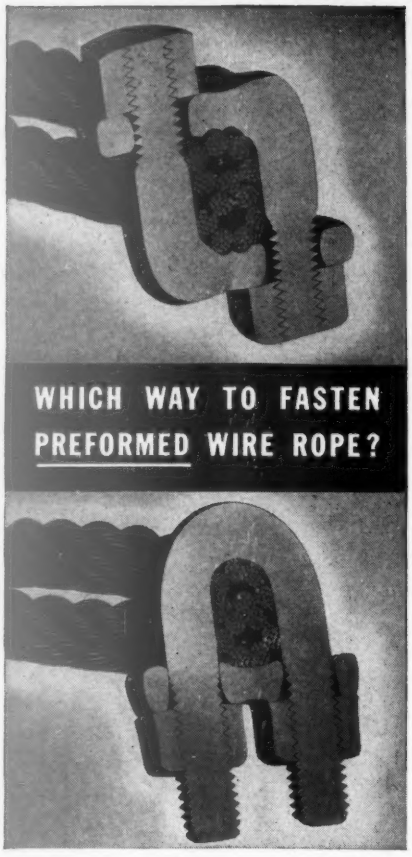

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lish on, from Plum Run, O., to Charleston, W. Va., 138 cents per net ton, subject to Ex Parte 148-162 increase.

Docket 81762 (2)—Sand, all kinds, and gravel, in open-top cars, carload minimum weight 90 percent of marked capacity of car, except that when loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Sargents, O., to Trenton, O., 127 cents per net ton, subject to Ex Parte 148-162 increase.

Docket 81785 (2)—Slag, granulated and slag, commercial, crushed (a product of iron and steel blast or open-hearth furnaces), in open-top cars, carload minimum weight 90 percent of marked capacity of car. Establish on, from Lowellville, O., to Baltic, O., 116 cents per net ton, subject to Ex Parte 148-162 increases.

ILLINOIS FREIGHT ASSOCIATION DOCKET

Docket IRC-511-537—Sand (other than blast, core, engine, filter, furnace, foundry, glass, grinding, moulding, polishing, silica), gravel or strippings, sand or gravel pit, carload from Aurora, Oregon, Oswego, Ottawa and Wedron, Ill., to Beeline and Iowana, Ia. Present: $1.24 per net ton. Proposed: $1.10 per net ton, subject to X-148-162.

Docket IRC 511-538—Stone, viz: stone, ground or pulverized, crushed or rough quarried; also strippings of stone quarries, in straight or mixed carload, minimum weight 90 percent of marked capacity of car, except that when cars are loaded to full cubical or visible capacity, actual weight will apply, but not less than 40,000 pounds, from Prairie du Rocher, Ill., to Alton, Ill. Present: Combination. Proposed: 88 cents net ton, subject to X-148 increase.

Docket IRC 511-476-A — Stone, rough quarried, etc.: To amend item 4810 of I.F.A. Tariff No. 80-D to include riprap stone along with ground limestone for application on Illinois intrastate traffic.

Docket IRC 511-497-A — Agricultural limestone, carload, minimum weight 90 percent of marked capacity of car, except that when cars are loaded to full visible or cubical capacity, actual weight will apply, but not less than 60,000 pounds, from Prairie du Rocher, Ill., to (representative) stations on Southern Ry.: New Baden, Ill., 91 cents; Walnut Hill, Ill., 99 cents; Fairfield, Ill., 110 cents; Browns, Ill., 116 cents; Mt. Carmel, Ill., 127 cents, being proposed rates. Present: combination. Meeting, November 12, 1946, 10 a.m.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

Docket 67831 (1-A)—To cancel rate of 83 cents net ton on crushed stone, published in Item 1000 A of B.&M. Railroad I.C.C. A 3045 from Greenfield, Mass., to Petersburg Junction, N. Y., permitting mileage commodity rates to apply in lieu thereof. Reason: obsolete.

DOCKET AND STATUS REPORT OF PRIOR SOUTHERN FREIGHT ASSOCIATION SUBMITTALS

Docket 36086—Publish rate of 347 cents net ton on clay or kaolin, carload, Huber, Macon, Reids, Ga., and Bath-Langley, S. C., group to Milan, Tenn. (Shipper; suggested by carrier.

Docket 36087—On clay or kaolin, carload, as per item 555 of Southern Freight Traffic Bureau tariff 10-U, it is proposed to establish rate of 330 cents net ton from Bath-Langley, S. C., group to Apopka and Orlando, Fla. (Shipper.)

Docket 36114 — Amend commodity description in connection with rates on gypsum, crude or crushed (not ground), Jacksonville, Fla., Port Wentworth and Savannah, Ga., to destinations in Alabama, Georgia and Tennessee, published in items 6000-B through 6075-C, Sup. 36, Hoke's I.C.C. 507, now reading: "Gypsum, crude or crushed (not ground) in bulk, minimum weight 80,000 pounds" to read: "Gypsum rock, crude or crushed (not ground), in bulk, minimum weight 80,000 pounds." (Shipper; suggested by carrier.)

Docket 36003-2—On ground or pulverized clay, not otherwise indexed by name, carload, establish rate of 600 cents net ton, Butler, Clayfields, Dedrich, Gardner, Gordon, McIntyre, Oconee, Tennille, Toomsboro and Wriley, Ga., to Beaumont, Bellaire, Houston, Magazine Spur and West Junction, Texas, and rate of 655 cents per ton of 2,000 pounds, Savannah, Ga., to same points.

SOUTHWESTERN FREIGHT BUREAU DOCKET

Docket 40251 (2)—Crushed asphalt rock, etc., Blewett, Dabney, and Whitesmine, Tex., to Lake Charles, La. To establish a rate of $2.60 per ton of 2,000 pounds on rock, crushed asphalt and stone, asphalt coated, carloads, minimum weight 90 percent of marked capacity of car, from Blewett, Dabney and Whitesmine, Tex., to Lake Charles, La.

Docket 40269 (1)—Silica sand, points in the Southwest, to Denver, Colo. To establish rate of $4.46 per ton of 2,000 pounds on silica sand, in box cars or in covered hopper cars, minimum weight 90 percent of marked capacity of car, but not less than 60,000 pounds, from Everton and Guion, Ark., Crystal City, Festus, Gray Summit, Hermann, Klondike, Ludwig, Pacific and Sand Pit, Mo., Manley and Portage, Wis., Ottawa, Utica and Wedron, Ill., to Denver, Colo.

Docket 40407 (1)—Plaster, etc., Hockley Mine, Tex., to interstate points. To establish rates on plaster and other articles named in Section 1, Item 5, S.W.L., Tariff 166-C and Section 1, Item 15, S.W.L., Tariff 219-D, from Hockley Mine, Tex., to destinations in Alabama, Florida, Georgia, Kentucky, Mississippi and South Carolina, based on short line distances from Hockley Mine, applied to the F.S.A. 12704 scale plussed 25 percent with a maximum plussage of 5 cents, increased under Ex Parte 123. Representative examples of which are as follows:

Birmingham, Montgomery, Ala.	32 cents
Miami, Fla.	41 cents
Penscacola, Fla.	30 cents
Atlanta, Ga.	34 cents
Owensboro, Ky.	35 cents
Greenwood, Miss.	29 cents

Docket 40408 (1)—Plaster, etc., Hockley Mine, Tex., to interstate points. To establish rates on plaster and other articles named in Item 60, Southwestern Lines Tariff 31-N, from Hockley Mine, Tex., to destinations in Arkansas, Louisiana and Missouri, based on short line distances from Hockley Mine, applied to the F.S.A. 12704 scale, plussed 25 percent with a maximum plussage of 5 cents, increased

under Ex Parte 123. Representative examples of which are as follows:

Fort Smith, Little Rock, Ark.	28 cents
Baton Rouge, La.	24 cents
New Orleans, La.	26 cents
Kansas City, Mo.	32 cents
St. Louis, Mo.	34 cents

Docket 40411 (1)—Stone, Denver, Colo., to the Southwest. To establish a mileage scale of rates on crushed or ground stone, carloads, from Denver, Colo., to stations in Southwestern territory. The rates to be based on Item 1530, S.W.L. Tariff 162-S plus 30 cents per ton. General routing in SWL Tariff 270-A to apply.

TRUNK LINE ASSOCIATION DOCKET

Supplement 1 to 43805—(Originated by shippers.) Slag, unsuitable for the further extraction of metal, not granulated, carload, minimum weight 90 percent of marked capacity of car, etc., to Mullens, W. Va., from Swedeland, Pottstown and Birdsboro, Pa., $3.63, and Sparrows Point, Md., $2.75 per net ton, in lieu of current sixth class rates.

Docket 43816—(Originated by shippers.) Slag, coke oven, in bulk, in open-top cars, carload minimum weight 90 percent of marked capacity of car, etc., from Mount Pleasant, Pa.:

To P. R. R. Stations	Proposed Rates (Cents Per Net Ton)
East Palestine, Columbiana, Wellsville, O.	121
Wooster, Cleveland, Ashtabula, O.	154
East Liverpool, O.	110
Salineville, Kensington, Atwater, Warren, Cadiz, O.	132
East Orwell, Cuyahoga Falls, O.	143

In lieu of current classification basis.
Reason: On same basis as rates applying from and to other points.

Docket M-4982 — (Originated by shippers.) Gypsum, not calcined, crude, carload, minimum weight 90 percent of marked capacity of car, but not less than 80,000 pounds, from Philadelphia, Pa., to York, Pa., $1.60; Hagerstown, Md., $1.90; and Security, Md., $1.90 per net ton. Reason: Comparable with rates applying to other points.

Docket 43870—(Shippers) Sand (other than ground or pulverized or naturally-bonded moulding) and gravel, in open-top cars without tarpaulin or other protective covering, carload. Sand (other than ground or pulverized or naturally-bonded moulding) in closed cars or in open-top cars with tarpaulin or other protective covering, carloads, minimum weight as shown in Note 4 of N.Y.C. tariff 1911, I.C.C. 416, from Blossvale, Humaston and McConnelsville, N. Y., to Palmyra, N. J., $2.64 per net ton, in lieu of current sixth class rate. Reason: On same basis as rates applying from and to other points.

WESTERN TRUNK LINE NEW APPLICATIONS

Docket E-41-787—Sand and gravel, carload from Muscatine, Ia., to Denver, Colo. Proposed: $4.46 per net ton, subject to X-148-162 increase. (By shipper.)

Docket E-41-789 — Stone, crushed or ground, from Denver, Colo., to destinations in Western Trunk Line territory. Proposed: Establish commodity rates to destination groups using the same grouping as prevails for class rates in Western Trunk Line territory. Rates to be based on short-line distance from Denver, Colo., to the key points in the class rate groups, using the interstate joint line scale application on crushed stone in Item 1530, S.W.L. Tariff 162-S, Agent D. Q. Marsh's I.C.C. No. 3614, plus 30 cents a ton. Rates to be subject to X-148 increase.

Docket E-41-790 — Limestone, ground, carload, from Ash Grove, Mo., and Fort Scott, Kan., to Memphis group points. Present: 18 cents per 100 pounds as provided in Item No. 1510 of Western Trunk Line Tariff 33-O. Proposed: To cancel present rate (obsolete), permitting class or combination rates to apply.

Trade Literature

The pieces of literature listed below can be obtained direct from the manufacturers named, or requests can be addressed to Pit and Quarry's "Service to Readers" Department.

THE STORY OF 1946 CODE CHANGES. 15 pages. Publication No. C-60. Anaconda Wire and Cable Co., 25 Broadway, New York 4, N. Y.

HOW THE DOMINANT DRIVE SPEEDS PRODUCTION, REDUCES COST. 16 pages. Multiple V-belt Drive Association, 22 W. Monroe St., Chicago 3, Ill.

ROTO CLONE DUST CONTROL. 34 pages. Bulletin No. 270-A. American Air Filter Co., Inc., Louisville, Ky.

THE BUCKEYE BOOSTER. 10 pages. Perpetual Pamphlet Kit. The Buckeye Traction Ditcher Co., Findlay, O.

THE SPIRIT OF TRANSPORTATION. 4 single sheets. Clark Equipment Co., Buchanan, Mich.

HERCULES PRODUCTS. 40 pages. Form 685. Hercules Powder Co., Wilmington 99, Del.

REX BELT CONVEYOR IDLERS. 25 pages. Bulletin No. 463. Chain Belt Co., Milwaukee, Wis.

ECONOMY PUMPS. 8 pages. Catalog No. C-945. Economy Pumps, Inc., Hamilton, O.

AIR OPERATED DRILL JUMBO MOUNTING. 6 pages. Form 4034. Ingersoll-Rand Company, 11 Broadway, New York, N. Y.

GENERAL CATALOG. 26 pages. Form GC 1. American Hoist & Derrick Co., St. Paul 1, Minn.

JOHNSON ALL-WELDED CLAMSHELL BUCKET. 8 pages. C. S. Johnson Co., Champaign, Ill.

ROD SELECTOR CHART. 2 pages. Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.

BUYING GUIDE OF ALLIS-CHALMERS EQUIPMENT FOR THE PROCESS INDUSTRIES. 16 pages. Booklet 25B6177B. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

BAILEY INSTRUMENTS AND CONTROLS FOR THE PROCESS INDUSTRIES. 8 pages. Bulletin 17. Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.

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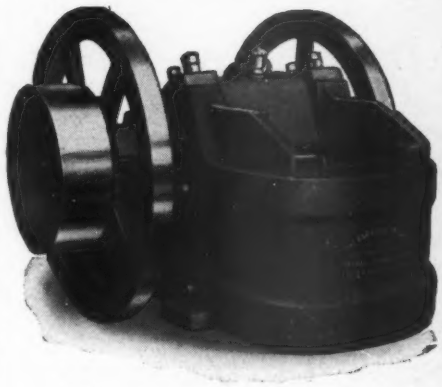

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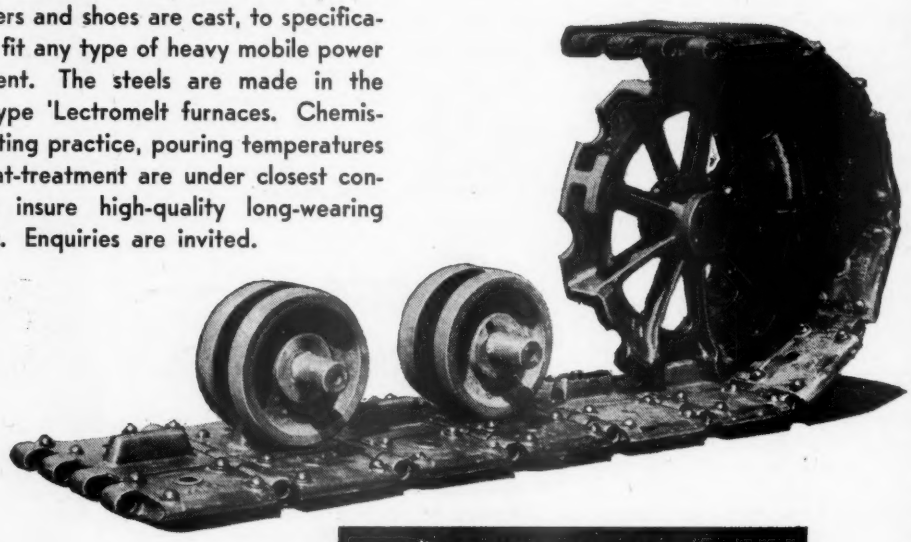

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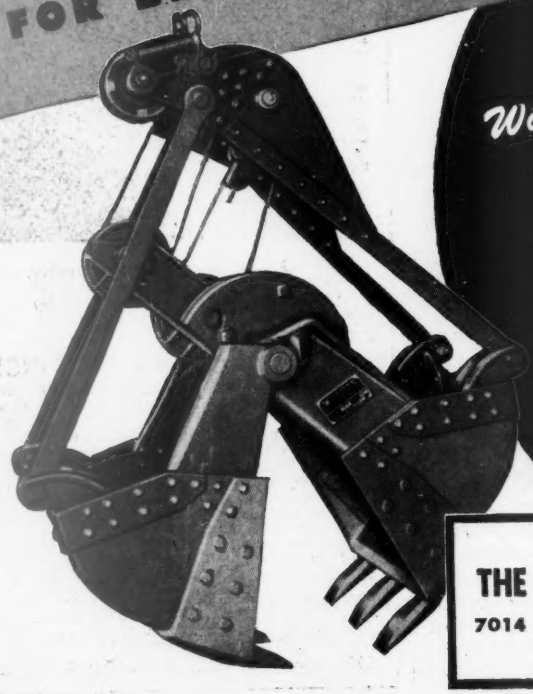

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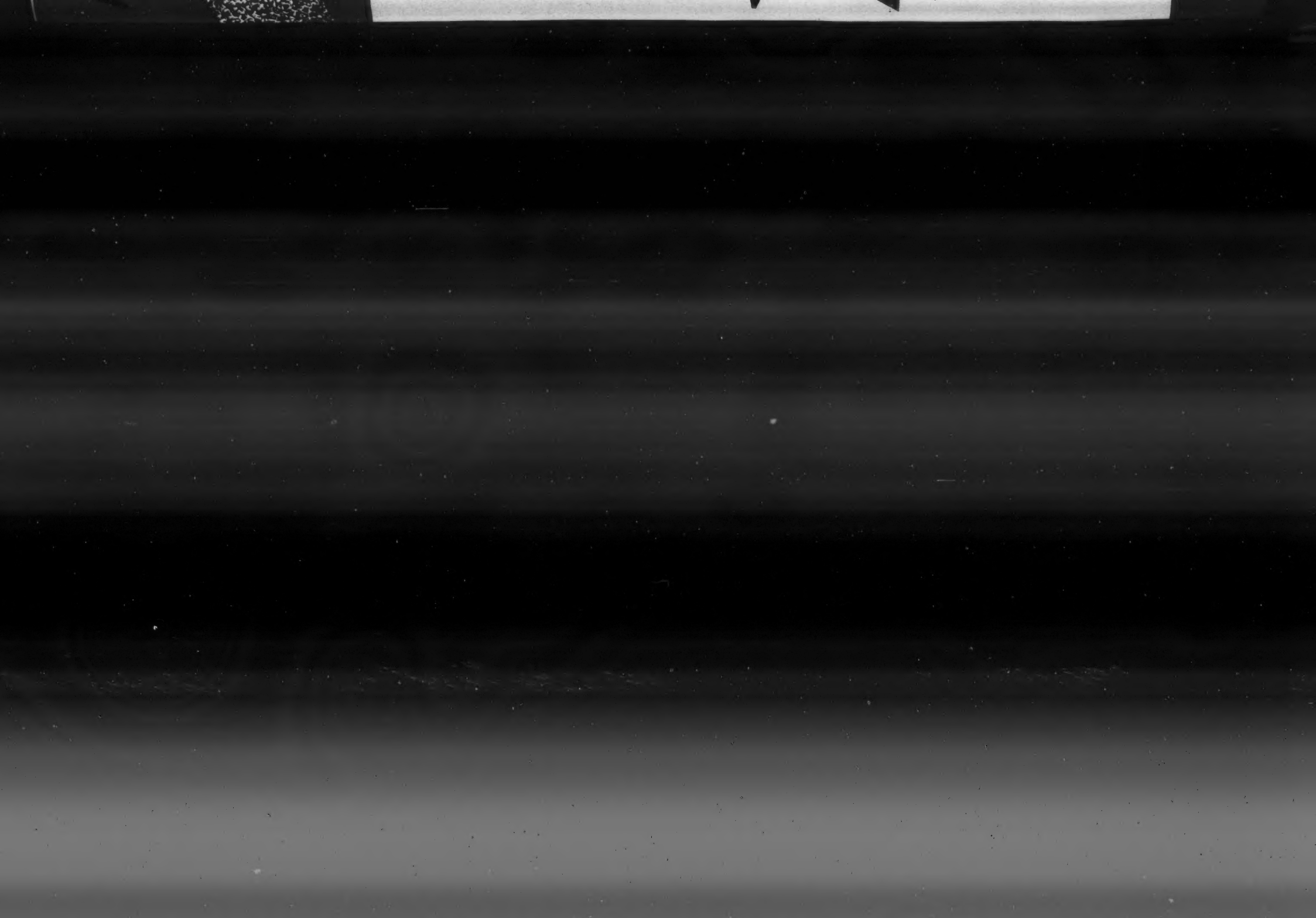
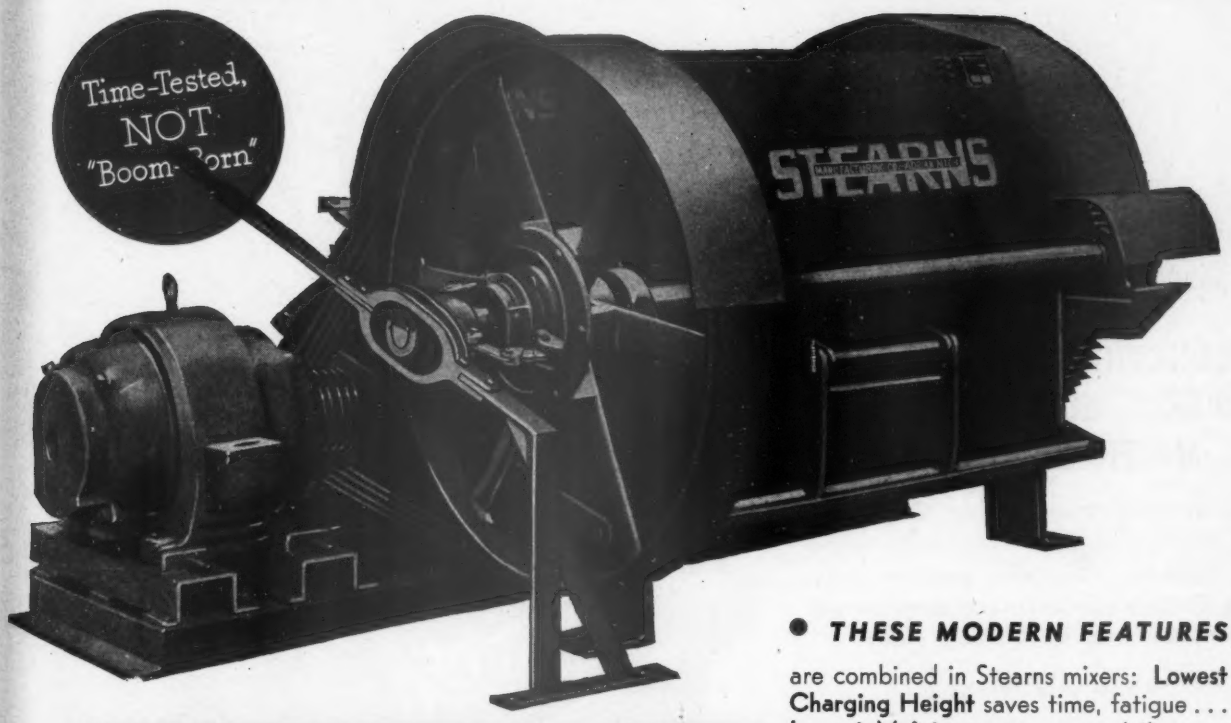


December, 1946

CONCRETE MANUFACTURER

A Special Section of ...



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The CONCRETE MANUFACTURER

DECEMBER, 1946

Vol. 10 No. 6

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J. A. CONVERSE

N.C.M.A. Officers Hear Exposition-Convention Plan At Pres. Lynde's Meeting

Dean Lynde, president of the National Concrete Masonry Association, was host on September 13 to the association's executive committee at an important meeting in Denver. All preliminary arrangements for the 1947 Concrete Industries Exposition were reported to have been completed. The exposition, sponsored by the National Concrete Masonry Association, will be held at the Hotel Sherman in Chicago February 17 to 20 in conjunction with the association's annual convention.

It was announced at the Denver meeting that an annual $500 award had been established by Thomas W. Noble of the Thomas W. Noble Company of Chicago for the most notable contribution made by a member or a member employee to the advancement of the concrete masonry industry. Those attending the meeting were informed that several sub-committees had been formed to deal with the following subjects: curing methods; plant design, equipment and operation; products development and construction practices; aggregates and related materials.

Mr. Lynde, who is the vice-president of Cinder Concrete Products, Inc., of Denver, acted as the group's guide during a tour of his company's plant. The guests inspected the new office building, which houses air-conditioned offices and the plant's testing laboratory.

A.C.P.A.'s Peckworth on Price Decontrol News

On the subject of the American Concrete Pipe Association's attempts to secure price decontrol for the concrete pipe industry and how it all ended, Howard F. Peckworth, the association's managing director thus expressed himself:

"At the Brown Palace Hotel, Denver, early Sunday morning I received a letter from the National Housing Agency. . . . It informed me that NHA would not grant decontrol to the concrete pipe industry 'because of the established NHA policy to hold price ceilings on all building materials essentiaal to house construction.' . . . While still talking out loud to myself I walked over to the newsstand and bought a copy of the Sunday (November 10) paper and read . . . that President Truman, as of Saturday midnight, abolished all government price and wage controls, with the exception of rents, sugar and rice . . . I think I'll take a week's vacation."

Mr. Peckworth expressed the opinion that if the association and leaders of the industry had not made strenuous efforts to bring about the abolition of price control on building materials, President Truman might have delayed this momentous decision for some time.

Mr. Peckworth declared, however, that although a battle had been won, the fight was not over. He reminded members that the Office of Price Administration had recommended decontrol to the NHA on the basis of pipe size if decontrol were granted at once. He urged pipe makers to work for the establishment of a fair and equitable price schedule.

Portland Firm Now Operating In Newly-Built $120,000 Plant

At the $120,000 plant of the Empire Building Material Company of Portland, Ore., production of concrete masonry units recently began at the rate of 15,000 per day. Load-bearing tile of 6- by 8- by 16-inch, 8- by 8- by 16-inch and 12- by 8- by 16-inch sizes, as well as partitioning tile of 4 by 8 by 16 inches, are made with sand and gravel aggregate and also of lightweight aggregate, such as pumice. Production of other items—fractional sizes, concrete brick, units with rounded corners and window sash blocks—is contemplated.

A six-story tower, topped by four bins for sand, gravel, cement and pumice is a special feature of the plant. The firm had previously operated a plant at another Portland location. H. L. Priest is president of the company, and C. H. Farrington is secretary-treasurer.

Coming Events

January 27-30, 1947 — Chicago. 28th annual convention, Associated General Contractors of America, Inc., Stevens Hotel.

February 17-18, 1947 — Chicago. 41st annual convention, Sand-Lime Brick Association, Hotel Sherman.

February 17-20, 1947 — *Chicago.* Annual meeting and exhibit, National Concrete Masonry Association, Hotel Sherman.

February 23-25, 1947—St. Louis, Mo. Annual national convention, American Concrete Pipe Association, Statler Hotel.

March 5-7, 1947 — Los Angeles. 17th annual convention, National Ready Mixed Concrete Association, Biltmore Hotel.

California Concrete Pipe Makers Hear Talks on Vital Problems of Their Industry

More than 50 members of the California Associated Concrete Pipe Manufacturers and other interested individuals met November 1 and 2 at the Fresno Hotel in Fresno, Calif., for the regular fall meeting of the group.

The highlight of the gathering was a talk by Howard F. Peckworth, managing director of the American Concrete Pipe Association, who flew to the Pacific Coast from his Chicago headquarters especially for the meeting. Mr. Peckworth told of the determined effort his association has made during the past year to obtain decontrol of pipe prices under the OPA and, while unsuccessful at the time of the Fresno meeting, Mr. Peckworth predicted that the industry would obtain early relief either in the form of decontrol, or by winning an automatic general price increase. He urged his listeners to exert every effort through their congressional representatives to register opposition to the Wagner-Ellender-Taft bill which will be re-introduced at the 80th session of congress and which, if enacted into law, would permanently control the entire construction industry.

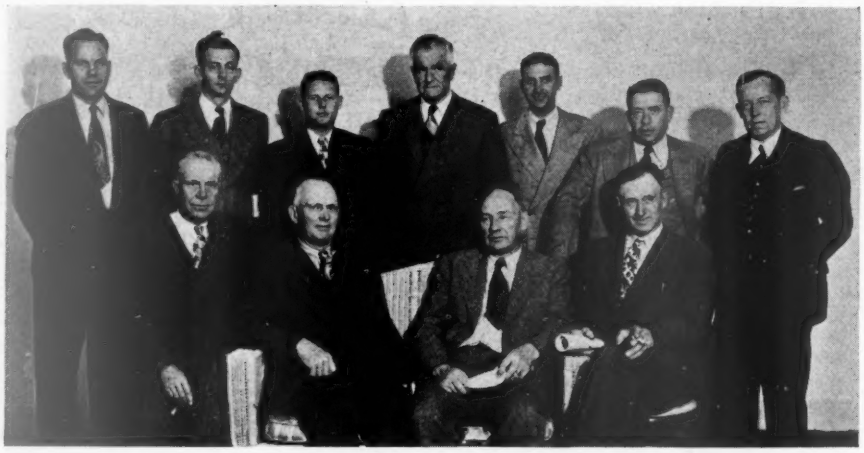
The extensive testing program now in progress at the University of Minnesota was outlined by Mr. Peckworth. These tests, sponsored by the A.C.P.A., are being conducted under actual field conditions to compare the hydraulic characteristics of 24-inch concrete pipe with corrugated metal and other competing pipes. He also reported that a new directory of concrete-pipe manufacturers is being compiled by his association and that copies are to be mailed to every interested organization in the country as soon as it is off the press.

The Californians were also honored by the presence at the meeting of C. M. Howard, engineer-manager of the Concrete Pipe & Products Association of the state of Washington, who spoke on activities in the Pacific Northwest. Mr. Howard described some of the promotional work being carried on by his group and touched upon current labor relations and engineering problems which confront producers in that area. He also reported a new idea in joining concrete-pipe sections by use of the cement gun which, he opined, may be of inestimable value to the entire industry once it is perfected following the preliminary tests now in progress at Seattle.

Improvement in the supply of reinforcing mesh was reported by T. J. Kauer, manager of the Wire & Steel Reinforcing Institute, who said that current production is being maintained at or above the average of the last 10 years. With equitable distribution, concrete-pipe producers should be able to obtain sufficient reinforcing material to meet present demands, he said. Before heading the steel institute, Mr. Kauer represented the A.C.P.A. at the nation's capital and he was, therefore, no stranger to the pipe-men.

Because of the large volume of irrigation pipe slated for use in the lower San Joaquin Valley following the completion of the Friant-Kern Canal within the next three years, a talk by R. B. Cozzens, district engineer of the Central Valley Project was of especial interest. Mr. Cozzens reviewed the plans for the project and reported that a closed distribution system (underground piping) is being planned instead of a system of open canals. Further details were brought out in another talk by Henry Weigand, who has represented the California association at the Bureau of Reclamation in Denver, Colo.

Chairman of the sessions at the Fresno meeting was Harold W. Chutter (Jourdan Concrete Pipe Company, Fresno).



The board of directors, California Associated Concrete Pipe Manufacturers. Left to right, standing: A. M. Herman, Concrete Conduit Co., Colton, Calif.; Francis Porter, Lindsay Cement Products, Lindsay, Calif.; Hugh Pollard, Pollard Bros., Ltd., Fresno, Calif. (secretary-treasurer); L. S. Stroud, Stroud-Seabrook, Bakersfield, Calif.; L. L. Dobkins, Fewell Concrete Pipe Co., Garden Grove, Calif.; Fred N. Linn, United Concrete Pipe Corp., Modesto, Calif. (vice-president); C. V. Whalley, California Concrete Products Co., San Jose, Calif. Left to right, seated: H. W. Chutter, Jourdan Concrete Pipe Co., Fresno, Calif. (president); G. D. Williamson, Valley Concrete Pipe & Products Co., Yuba City, Calif.; H. A. Weigand, Concrete Conduit Co., Phoenix, Ariz.; O. H. Price, Healdsburg Concrete Pipe Co., Healdsburg, Calif.

Industry Hails Decontrol Of Ready-Mix—but Priority Controls Remain

Only a few days before President Truman announced that all commodities except rice and sugar were to be removed from the control of the Office of Price Administration, the National Ready Mixed Concrete Association had requested that agency to appoint an industry advisory committee. The purpose of such a committee would have been to work for decontrol, now a *fait accompli.*

However, the industry is still beset with a major problem—that of priority controls. The National Housing Administration and the Civilian Production Administration have reversed their decision to place ready-mixed concrete under limited priority controls in specified areas where cement is critically short. The agencies had agreed that ready-mixed concrete should be added to Schedule A of PR-33, but with priority controls effective only in Florida, Louisiana, Texas (Dallas County only) and Oregon. The order would have included ready-mixed concrete producers, concrete block manufacturers and building supply dealers, and would have authorized extension of HH and HHH ratings to the cement manufacturer. Numerous objections, directed chiefly against the extension of cement ratings to the manufacturer, caused the reversal of the decision.

Concrete Pipe Assn. to Hold Annual Meeting Feb. 23-25

The American Concrete Pipe Association will hold its three-day annual national convention beginning Sunday, February 23, in the Statler Hotel, St. Louis, Mo. Attendance of industry members from England, Canada and other foreign countries, in addition to the United States members, is anticipated, according to the announcement made this week by Howard F. Peckworth, managing director of the association.

A series of technical papers, election of officers, and the annual dinner will highlight the program, which opens with a board meeting on Sunday afternoon, February 23. The dinner is scheduled for Tuesday night, February 25.

J. Morley Zander, secretary and treasurer of the Sand-Lime Brick Association, has announced that the group's 41st annual convention will be held February 17 and 18, 1947, at the Hotel Sherman in Chicago. Association meetings will be held in Room 116.

● The prevailing methods and types of equipment for producing ready-mixed concrete or concrete products can be found in the Concrete Industries Yearbook.

Corbetta Produces Reinforced Slabs In Big New Bronx Plant

By WILLIAM M. AVERY

another ON THE SPOT report

THE Corbetta Construction Company of New York City, which about a year ago purchased the patent rights to Flexicore reinforced-concrete floor and roofing slabs, are now operating the largest plant ever built for the production of Flexicore units. This new plant, located in the Bronx, New York, turns out 240 forms, or around 4,000 square feet, per 9-hr. day.

Patterned closely after the Price Brothers' plant at Dayton, Ohio, the Corbetta Flexicore Division is housed in a modern fireproof building which is 91 feet wide and comprises ten 18-foot bays in addition to cement, aggregate and coal storage rooms. Assembly conveyors, transfer tracks, vibrating piers, mixer and curing room are laid out in the assembly line pattern developed by Price Brothers, who formerly controlled the Flexicore patterns.

The Flexicore floor and roof slab is a prefabricated reinforced-concrete unit manufactured in a standard 6-by 12-in. section with two 4⅝-in. diameter cores. When installed, side grooves and keys provide a field grout bond between adjacent units to form a continuous flat slab 6 inches in depth. The steel forms used are of the knock-down type, consisting of 6-in. side channels clamped together with steel end-bulkheads, perforated for locating the reinforcing bars, and containing circular holes through which the rubber hose cores are inserted. The bottom of the form consists of a removable steel plate on which the smooth ceiling surface of the unit is cast.

• A view of the assembly line conveyor which runs the full length of the building. The forms are cleaned, bolted together and oiled; then steel is inserted and prestressed and core hoses are placed and inflated—all in successive operations.

• A general view of the Corbetta Construction Company's new Flexicore plant at the Bronx, New York. Floor and roof slab units are stripped when removed from the curing room, stacked on wheel trucks, and rolled into the yard through the wide door on the right.

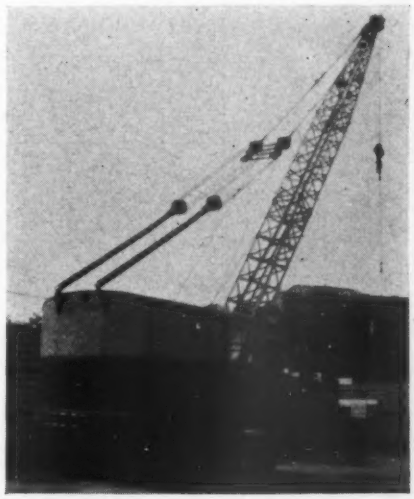
The tension reinforcing steel is threaded at the ends to permit prestressing the rods between the bulkheads to a tension of 16,000 p.s.i. This is accomplished with a special torsion wrench adjusted to apply 33 foot pounds to the ½-in. diameter rods. Steel stirrups hold the top bars in a fixed position relative to the bottom bars.

The heavy rubber hoses are inflated to a pressure of 6 p.s.i. to form the 4⅝-in. diameter cores. Before the form is poured, steel yokes spaced 14 inches on centers are clamped to the side channels to position and hold the cores at the proper elevation when the concrete is placed and the entire assembly is agitated on the vibrating piers. The hoses are deflated and withdrawn after the unit has been in the curing room for only three or four hours in order to accomplish two assemblies with each core hose during a shift. Early withdrawal of the hoses also eliminates the danger of serious bonding between the rubber and the concrete.

The slabs are cured for 22 to 24 hours at a temperature of 80 to 100 degrees F., after which the forms are stripped, the units are marked with date and destination and stored for additional air curing for from 5 to 7 days.

At the Corbetta plant the manufacturing process is fully continuous from the stripping of forms, through cleaning, assembling, reinforcing, pouring and curing. The forms are stripped on pier tables opposite the discharge end of the curing room. From this point they travel the width of the building on a cross gravity conveyor, and are transferred to an assembly conveyor which runs the full length of the building. The assembly conveyor consists of two lines of narrow wheel rollers spaced about 14 feet apart laterally and on about 6-in. centers in the direction of

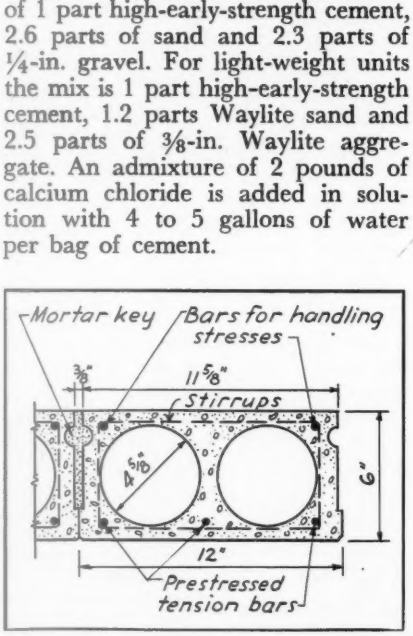
• Units are loaded on trucks in the yard with a crawler crane.



travel. The wheels are bolted to angle iron frames supported on posts at convenient working height above the level of the floor.

On the first section of the conveyor the forms are given a preliminary cleaning before they are assembled. Then separate crews successively do the final cleaning and oiling, place cages and rods, prestress the steel, and insert and inflate the core hoses. At the far end of the conveyor the assembled form rolls onto a transfer car and the core-hose-positioning yokes are clamped in place. The car moves on rails across the building, and the form, now ready for pouring, is rolled onto the three vibrating piers in front of the mixer.

The company uses two mixes, identified as *standard* and *light-weight*. The standard mix consists of 1 part high-early-strength cement, 2.6 parts of sand and 2.3 parts of ¼-in. gravel. For light-weight units the mix is 1 part high-early-strength cement, 1.2 parts Waylite sand and 2.5 parts of ⅜-in. Waylite aggregate. An admixture of 2 pounds of calcium chloride is added in solution with 4 to 5 gallons of water per bag of cement.



All materials are received at the plant in trucks, which, in the case of aggregates and cement, discharge their loads into a hopper on the roof of the building. This convenient arrangement is made possible by the fact that the yard level is far enough below the general grade in the vicinity that the plant roof is at the same elevation as the adjacent street. A two-compartment bin holds 20 cubic yards each of sand and gravel. Cement is stored in a 400-bbl. single-compartment bin. The bins are located over the 17-S Besser open-paddle mixer, and the materials are fed by gravity. The mixes are proportioned by volume, and the mixer is kept in operation almost continuously.

The motors in the three vibrating piers on which the forms rest are started as soon as the concrete begins to flow. The short amplitude vibration continues for about 90 seconds, after which the form is picked up with a special lifting beam and set on the form trucks. Twenty forms (4 across and 5 high) are stacked on each pair of trucks; a full kiln holds 12 form carts, or 240 forms in all. About 80 percent of the forms are 22 feet 6 inches long for making the maximum length Flexicore units. The smaller size measures 16 feet 6 inches.

The curing room is heated with dry steam only, and no moisture is introduced at any time during the curing cycle. The theory back of this is that sufficient moisture is furnished by the more than 50,000 square feet of exposed, freshly-poured concrete surface in the slab units, themselves. The form trucks are pulled through the kiln by means of a drum hoist operating through a sheave at the discharge end.

After the green units have cured for 3 or 4 hours, the core tubes are deflated and withdrawn through drop doors on the open side of the curing room. On units made late in the day, the night watchman opens the valves in the ends of the tubes so that they may be withdrawn easily the following morning. The end doors on the feed end are kept closed during the day except when freshly poured units are rolled in. At the end of the day all doors are closed and the steam is kept on for the entire night.

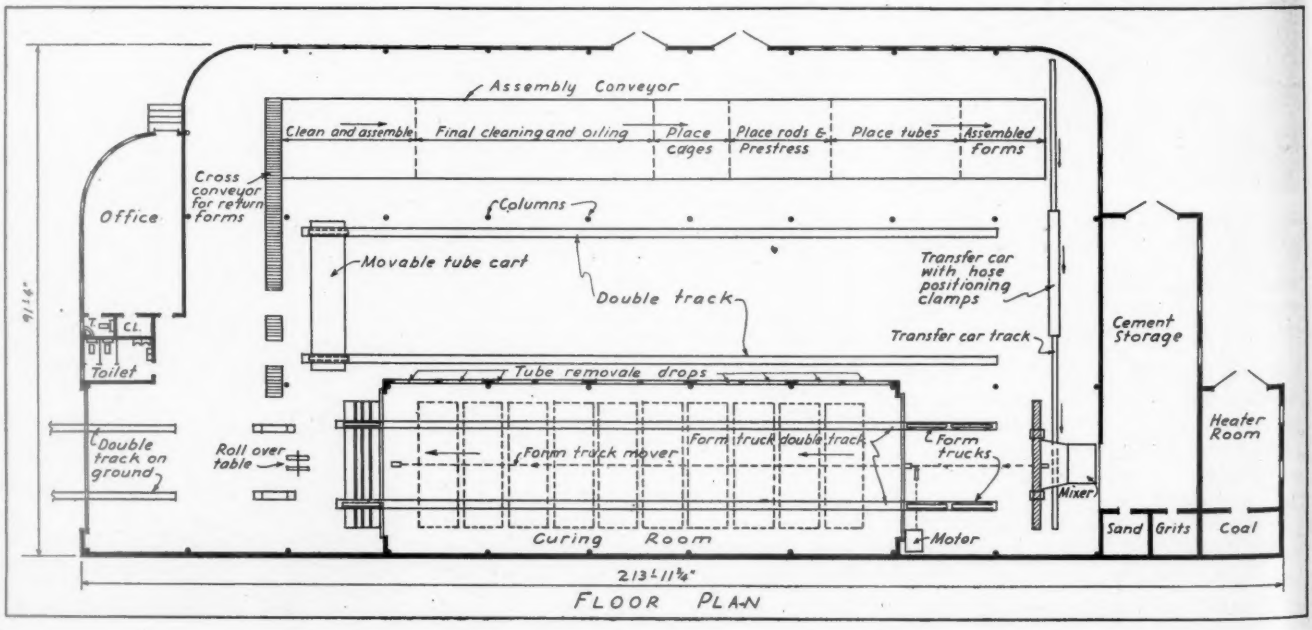
The cycle is completed the following day when the form trucks are rolled out of the far end of the room one by one, and the forms are stripped and started down the assembly line again. The long curing cycle, the use of high-early-strength cement and calcium chloride, and care in the proportioning of materials, brings the concrete up to 3,750 p.s.i. in 24 hours.

The freshly stripped slabs are rolled on trucks, through a wide doorway in the end of the building, onto the storage yard, where they are stacked in piles and held for a 7-day air-curing cycle. A Speedcrane is used for handling the units in the yard and for loading the three 15-ton flatbed trucks used for deliveries. Standard Flexicore units weigh 40 pounds per foot.

(*Continued on page* 134)

• Left: A section through a Flexicore slab, showing the side grooves and keys which provide a field grout bond between adjacent units.

• Below: Plan and flow sheet of the new Flexicore plant, showing the assembly line procedure by means of which more than 1,000,000 square feet of floor and roof slabs can be produced with only 240 forms.



Wartime Ready-Mix Plant Adds Products in Peacetime Expansion

THE Flamingo Concrete Pipe Company of Sanford, Florida, operates a combined pipe, block and ready-mixed-concrete plant acquired by purchase in June, 1944, from the Universal Concrete Pipe Company. The plant was built in 1943 to help in supplying the huge tonnage of concrete pipe required for the many airports and army camps then under construction throughout the Florida peninsula. Facilities for the production of block and ready-mixed concrete were added later, for the primary purpose of supplying naval air base construction projects at Sanford and at Banana River.

By WILLIAM M. AVERY

Pipe in 4-ft. lengths, and 12 to 48 inches in diameter, is produced on a Universal machine at the rate of about 80 tons per 10-hour day. Florida sand and Alabama gravel, both shipped in by railway, are used in pipe production. The materials are batched in wheelbarrows and mixed in a 28-cu. ft. Stearns mixer, which feeds the pipe machine by means of a conventional skiphoist and hopper arrangement.

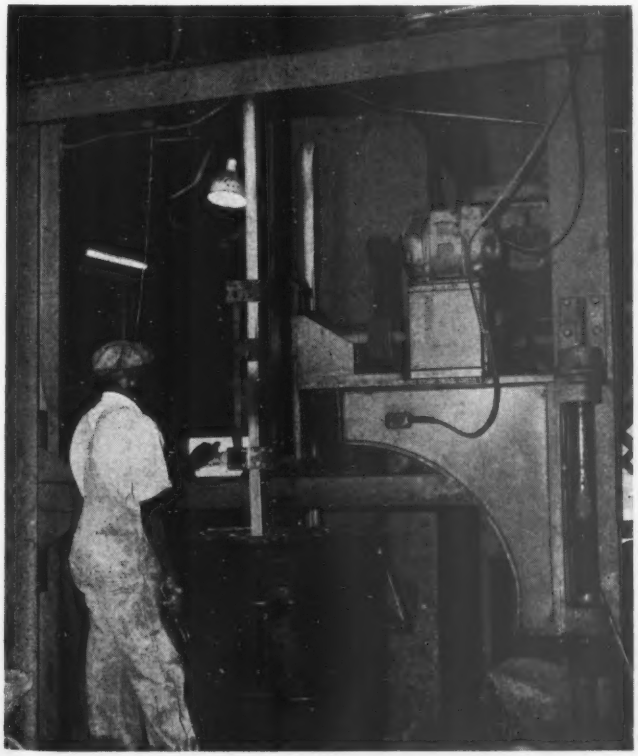
• General view of the Flamingo Concrete Pipe Company's plant at Sanford, Fla.

Normally the 12, 15, and 18 inch sizes of pipe are plain, with everything larger than 18 inches being reinforced, but on special orders the company also places reinforcing in the smaller diameters. The molded pipes are kept in curing rooms under continuous water spray for five days before they are removed to the storage yard, where they are maintained in a wet condition for an additional 5-day period. About 350 tons can be accommodated under roof. The company operates a Thomson-Gibb electric welding machine for fabricating reinforcing steel. Practically all pipe shipments are made by truck, with state highway contractors now receiving the major share of the tonnage.

The block plant, located in the same building as the pipe plant, is producing 2,000 8- by 8- by 16-inch equivalents on three Appley machines—two singles and one double.

(*Continued on page* 134)

• Below, left: The pipe machine makes 4-ft. lengths from 12 to 48 inches in diameter. Right: The mixer for the block plant is located on a timber platform above the three machines.



SEMI-AUTOMATIC PLANT INSTALLED BY ILLINOIS CONCRETE FIRM

By FLOYD C. LEVERETTE

another ON THE SPOT report

WITH the completion of a new ready-mixed concrete plant of 800-cu.-yd. capacity, the Henry E. Nelch and Son Company of Springfield, Ill., becomes one of the largest ready-mixed concrete producers in the Middle West. Founded in 1896, the company's activities centered around the sale of sand, gravel, and building supplies. In 1929 Henry E. Nelch and Emmett Rebok formed a partnership and entered the ready-mixed concrete business.

The first plant was largely of wooden construction with the operations manually controlled. The storage bins, which were charged by a crane, would accommodate only three types of aggregates, and bagged cement was used as there were no facilities for handling bulk cement. This old plant, which is still used for a stand-by and for special mixes, was responsible for building up the Nelch Company's business to the extent that a larger plant was necessary to meet the increasing demands in Springfield.

Because the original plant had given satisfactory service, the C. S. Johnson Company of Champaign, Ill., was again called in to design and build a new semi-automatic plant. Basically a central-mix system, the plant has a potential output of 700 to 800 cubic yards per 8-hour day.

All aggregates, obtained in cars or by truck, are discharged into either a track hopper or a truck hopper; a Barber-Greene 3-section belt conveyor system handles the distribution to the respective bins. A 24-inch by 69½-foot belt conveyor connects the two hoppers to the main conveyor line reaching the bins atop the plant; this conveyor system makes a 90-degree turn between hopper and bins.

The second leg of the conveyor system is made up of two 24-inch Barber-Greene belt conveyors, one 128 feet long and the other 82 feet, having a total lift of 72 feet. At the transfer point a diversion chute has been provided for loading bins at this point. This system has a capacity of 300 t. p. h., and is interlocked so that the lower conveyor will not run unless the one above it is running. Controls are located at the head end and loading end in order that all three conveyors can be started from any transfer point.

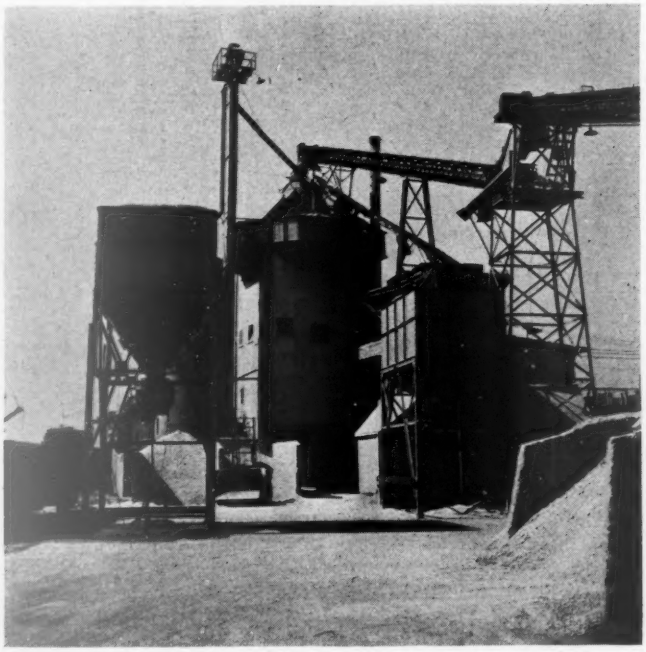
The crest of the conveyor line is directly above the center of the five-compartment octagonal C. S. Johnson bin, which has a total capacity of 314 cubic yards. Material from the conveyor can be distributed to any one of the five compartments, or by-passed to the bin of the old plant through a pivoted ball-bearing distributing chute which is controlled by a cable from the foot of the belt conveyor. Normally, torpedo sand, ⅜-inch stone, and 1½-inch, ⅞-inch, and ⅜-inch aggregates are stored in the corresponding compartments.

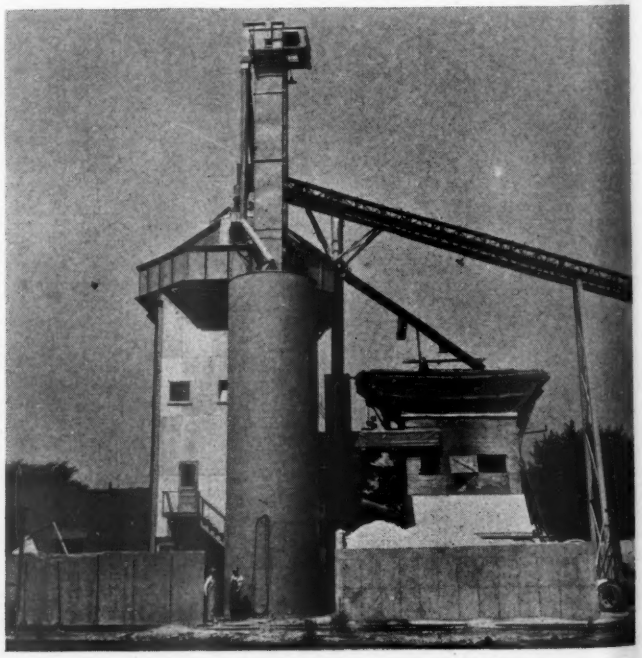
The five compartments of the bin are arranged radially about a central cement storage tank which is divided into two sections having capacities of 125 and 208 barrels, respectively. In addition to this central cement tank, an auxiliary 900-barrel, two-section cement silo is located between the plant and the bulk cement track

• Three views of the Henry Nelch & Son Company's plant at Springfield, Ill. Right: The belt conveyor connecting the track hopper with the conveyor system which leads to the aggregate bins.

• Below, left: The main batching plant (center), with belt conveyors at the right and bins for crushed stone and sand in the foreground.

• Below, right: The ready-mixed concrete plant, the bucket elevator and the bulk cement silo (left).

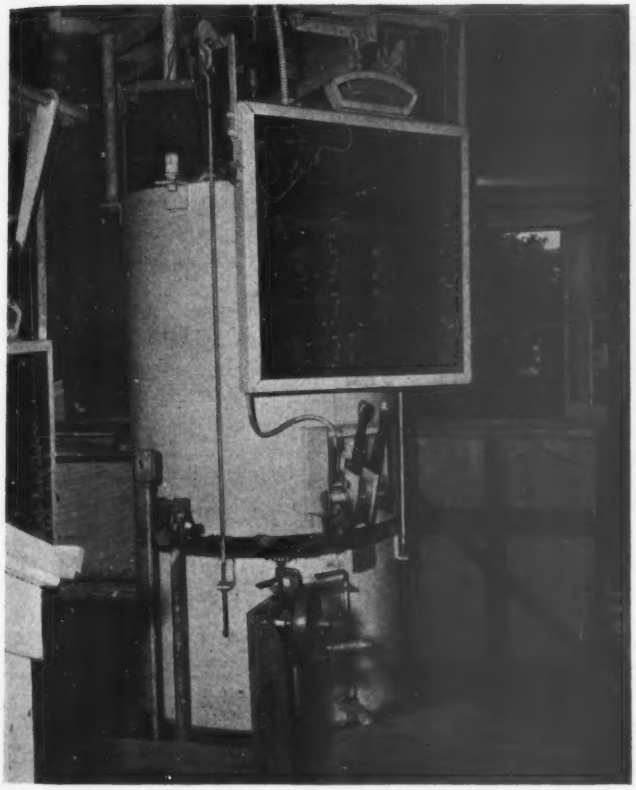


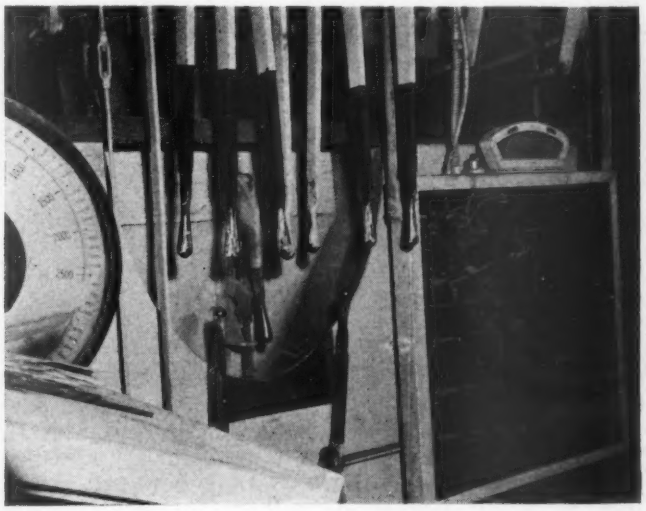


hopper. As the cement is fed into the hopper from bottom-dump cars, a 27-foot screw conveyor carries it to an 80-foot enclosed bucket elevator. The elevator carries the cement up about 80 feet to a point where the cement flow is controlled at the head end of the elevator by a two-way valve which will feed either the main batching bin or the auxiliary cement silo. At the top of the main bin another two-way valve is provided to route the cement into either of the two cement compartments; in this way the one elevator can be used for handling two different types of cement. The bucket elevator has a capacity of approximately 300 barrels per hour.

A third two-way valve on top of the auxiliary cement silo permits either section to be charged when two types of cement are to be stored. The bottom of the silo is fitted with a 50-degree cone which discharges through two rotary plug valves into the screw conveyor connecting the track hopper and bucket elevator. The bottoms of the silo and the cement compartment of the batching bin are equipped with a number of aeration fittings, so that low-pressure air can be admitted into the bin to keep the cement flowable. Bin signals are used in both bins to indicate the cement level.

With the bins located above the plant, gravity flow is effected throughout the remaining stages of the operation. A Johnson concentric batcher provides for weighing five sizes of aggregate on a Kron scale



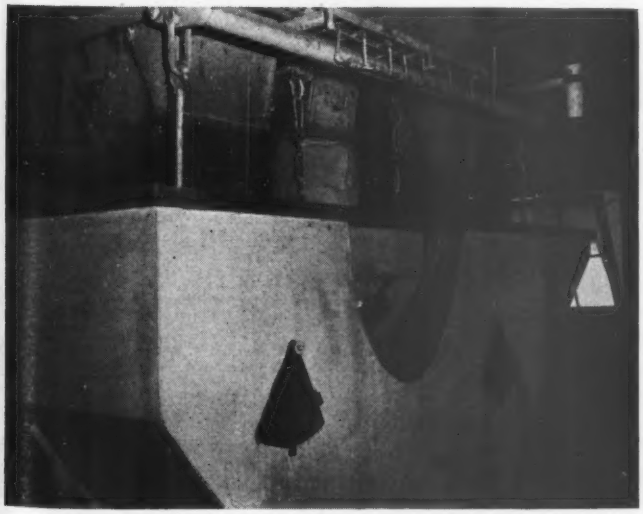


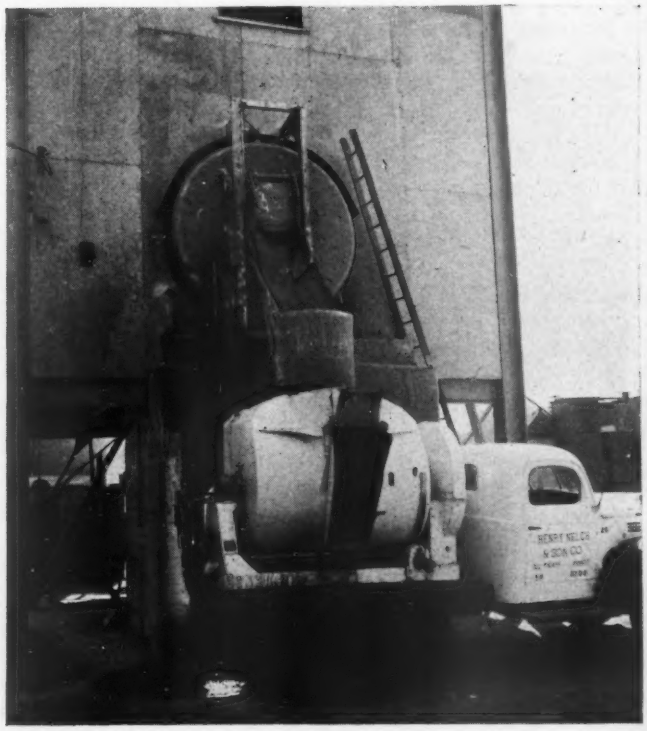
• Above: The weigh hoppers and the bin controls, with the scale for weighing five sizes of aggregate (extreme left) and an electrically controlled cement scale (right).

• Left: The semi-automatic water batcher, 1,000-pound capacity, which is controlled electrically by a 3-beam scale. Note the intercommunication speaker at the left of the scale. The crank in the foreground operates the endless belt to which job sheets are attached.

• Right: The 2-cu.-yd. mixer discharging into a 2¼-cu.-yd. open-top truck-mixer.

• Below: A view of the weigh hoppers and the concentric batcher. Ports on the side permit release of surplus in case of overweight.





with a cumulative dial, thereby facilitating the changing of the batch size without resetting the weigh beams. The cement is weighed in a separate hopper which is hung from a separate scale, but is located within a center compartment of the aggregate batcher. This cement batcher is provided with two rotary valves which allow the cement to be drawn from either of the two compartments of the central cement tank. Weight indication is by either of two scale beams and an "over and under" beam balance indicator.

Semi-automatic control cuts the cement flow just before the final weight is reached. The central arrangement of the cement batcher permits the cement to flow out in a controlled stream along with the aggregates when the batcher is discharged; this reduces dusting, and pre-mixes the batch. The batcher, of 2-cu.-yd. capacity, is provided with a two-way discharge; one spout feeds a Ransome 56-S 2-cu.-yd. mixer, and the other a chute so that truck-mixers or batch trucks can be charged directly from the batcher.

A C. S. Johnson semi-automatic water batcher of 1,000-lb. capacity and controlled electrically by a three-beam scale, supplies the mix water. The water batcher is equipped with an overhead surge tank for more accurate batching and for heating the mix water with live steam. Live steam for heating the mix water, aggregates, and pre-heating the mix, is supplied by an Otto boiler.

In order to reduce any possibility of vibration in the plant, the mixer is installed on a separate concrete footing, and at sufficient height to discharge directly into the truck-mixers or agitators. A large mirror has been hung from the side of the plant and directly above the mixer so that the operator on the batching floor can see when the trucks are in position for loading. As the driver pulls in for a load, he clips his order sheet to an endless canvas belt which carries the order up to the operator at the batch controls.

The company operates a fleet of 18 truck agitators, all of which are painted white and bear the company trade mark "RX." The 18 units include three International, four Ford V8, and six Dodge trucks, all mounting Concrete Transport mixers of 2-cu.-yd. capacity. Five additional Dodge trucks have 2½-cu.-yd. Concrete Transport mixers. Hauling of the concrete is not limited to the company's own trucks, as contractors who operate their own trucks can obtain either wet or dry mixes from the plant.

The Nelch company also handles

• The charging side of a 2-cu.-yd. mixer driven by a motor with a V-belt drive.

a complete line of building materials, including bagged cement and stockpiles of aggregates. Two Butler overhead bins are used for stocking crushed stone and sand. Below the main conveyor line are several aggregate stockpiles with concrete walls to separate one from the other. A Thew-Lorain crawler crane is used to charge these stockpiles from cars on a siding running parallel to them. Delivery of the bulk aggregates is done with either the company-operated dump trucks or those of the contractor. A Scoopmobile of 3,000-lb. capacity is used in loading all dump trucks, except in the case of the Butler bins, which can discharge directly into the trucks.

Other commendable features incorporated in this completely modern plant include a Sturtevant Speed Heater for heating the batching room, an intercommunication system between the batching room and the yard office, and a large garage with adequate facilities for storing and repairing the trucks, agitators and other equipment. The all-white trucks and agitators are washed inside and out several times daily to assure more accurate mixes and to give them their immaculate appearance as they roll along the streets of Springfield.

Corbetta Produces Slabs

(*From page* 130)

Even with its capacity of more than 1,000,000 square feet of slabs per year, there is no prospect that in the foreseeable future this new plant will be able to keep up with the tremendous demand for Flexicore units even in the immediate New York City area. Until the backlog of orders drops considerably, the company plans to confine its efforts to relatively large projects, leaving the small-home field for some future date.

Frank W. LaMorte is manager of the Flexicore Division of Corbetta Construction Company. Forty-five men are employed in the present single-shift operations.

Wartime Ready-Mix Plant

(*From page* 131)

The aggregate consists of crushed limestone shipped by railway from Brooksville, and stockpiled on the yard, adjacent to the building. The materials are wheeled to a pit just inside the building, and fed by means of a bucket elevator to an Anchor mixer resting on a timber platform above the three block machines. Rocks are handled both in the plant and on the yard with a Barrett-Cravens jacklift truck.

The molded units are kept under continuous sprays in the building for a day, then stored on the yard where they are soaked periodically for ten days. Three 11-ton trailer trucks are used for making deliveries.

To facilitate work at the Sanford naval airbase, about three miles from the plant, the company in July, 1944, purchased a used Johnson batching plant and three 1½-cu.-yd. Rex Motomixers. The 2-compartment bin has a total capacity of 30 tons. Here, as in the operations of both the pipe and the block plants, only bagged cement is used. The

• Fabricating a section of reinforcing steel with the electric welding machine.

batching bins are loaded from stockpiles with a yard crane.

The company employs a total of 30 men in its single-shift operations. S. B. Brinson is president of the corporation, D. F. Taylor is general manager, and T. A. Vaughan is superintendent of the plant.

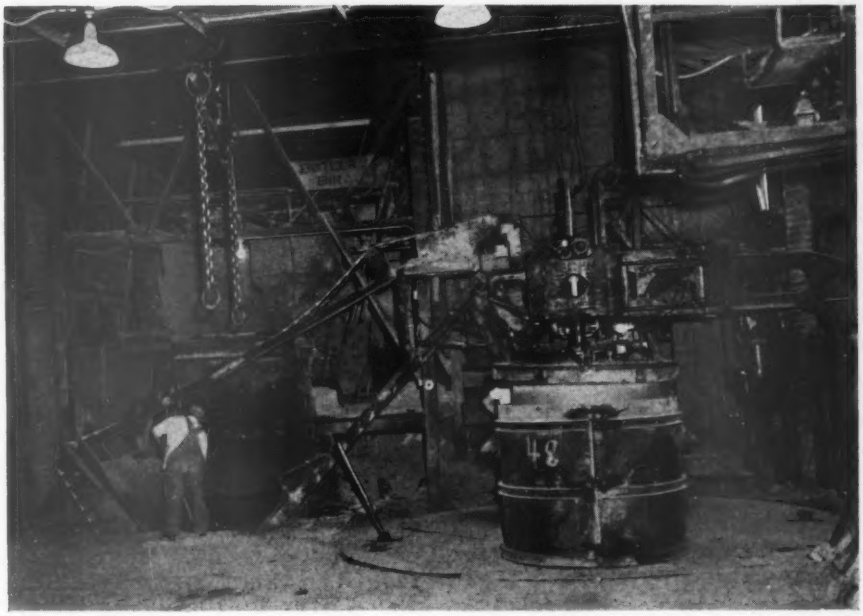
Fly Ash Successfully Employed by Two Midwestern Producers

By FLOYD C. LEVERETTE

another ON THE SPOT report

THE Illinois - Wisconsin Concrete Pipe Company, of South Beloit, Ill., and the Continental Concrete Pipe Corp., of Blue Island, Ill., are two concrete products plants which have experienced satisfactory results from the use of fly ash in concrete mixes. Quality standards for product, workmanship, materials and methods employed have been rigidly adhered to, but the addition of fly ash to the mix is credited with contributing much in the production of quality products having exceptional strength characteristics.

The plant in Blue Island, which is the smaller of the two plants, has been using fly ash for the past two years in producing concrete conduit for the Commonwealth Edison Company of Chicago as well as in all other types of concrete pipe. Fly ash has also been used at the South Beloit plant for the past two years in the production of "Prestcrete" pre-stressed, reinforced, concrete slabs, all types of concrete pipe which are made in sizes ranging from 4 to 72 inches, concrete drain tile, and concrete manhole blocks. The fly ash used at both plants is obtained in bags from the State Line Power Station, operated by the Chicago District Electric Generating Corporation.



• A pipe machine at the Illinois-Wisconsin Concrete Pipe Company's plant at South Beloit, Ill. This machine makes pipe in sizes from 36 to 72 inches. At the left are aggregate bins, weigh hoppers and a mixer which supplies the pipe machine.

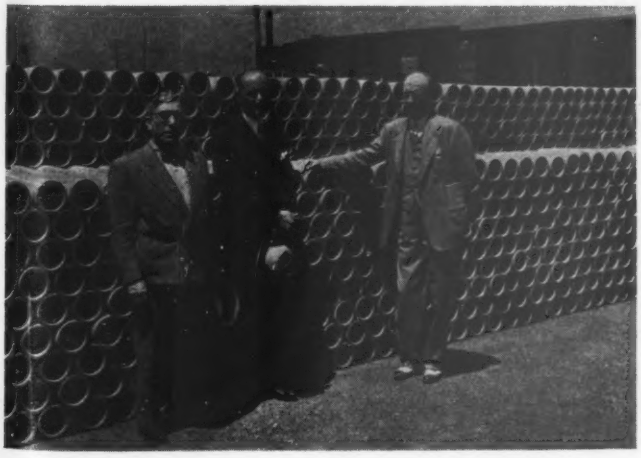
Fly ash, as obtained from the State Line Power Station, is the unburned impurities in the pulverized coal which is used in generating electrical power. These impurities are collected in Cottrell precipitators located between the boiler and stack. Since further processing of the fly ash is not necessary, it is bagged and shipped directly to the consumer.

The surface and strength characteristics of the concrete pipe and conduit, produced at the Blue Island plant, make it evident why fly ash is used regularly in all mixes.

The aggregates, sand and crushed stone, which are purchased on the open market, are brought into this plant in bottom-dump cars which dump into a track hopper. An underground belt conveyor connects the track hopper with a Barber-Greene bucket elevator which car-

• Right: Ray Sykes, superintendent of the Continental Concrete Pipe Corporation's plant at Blue Island, Ill., standing before one of the pipe machines. It produces pipe ranging in size from 6 to 36 inches.

• Below: A group of concrete pipe manufacturers, standing before stacked pipe in the Continental storage yard. Left to right: Harry K. Cain, Continental Concrete Pipe Corporation, Blue Island, Ill.; J. D. Mollendorf, Illinois-Wisconsin Concrete Pipe Company, South Beloit, Ill.; J. P. Calhoun, Consolidated Gravel Company, Columbus, Ga.



ries the material up to a 4-compartment bin of 7 carload capacity.

Directly below two of the bin compartments is a pair of volume type batchers, one for sand and one for crushed stone, which charge a 28-cu.-ft. Stearns batch mixer. This mixer supplies a Model H McCracken packer head type pipe machine which is driven by an International Diesel engine through a V-belt drive. Below the other two compartments is another pair of volume type batchers which charge a 12-cu.-ft. mixer. This mixer supplies a second pipe machine, which is a McCracken machine made especially for producing concrete conduit. As there are no facilities for handling bulk cement, bagged cement is used.

Fly ash is added to the mix at the same time the cement is added, in the proportion of 25 percent fly ash to the total amount of cement. This ratio of fly ash to cement permits the use of equal amounts of sand and crushed stone and at the same time achieving extremely smooth surfaces which, with a packer head type of machine, is a most unusual accomplishment. Without the use of fly ash, a 50 percent rock mix gives the product rough surface characteristics.

In addition to permitting the use of increased amounts of stone in the mix, the fly ash, 95 percent of which will pass through 200 mesh and 90 percent through 300 mesh, by virtue of its lubricating characteristics makes the mix extremely workable. The fly ash is given credit for the very smooth inside and outside surfaces of the products of this plant, a desirable quality especially in concrete conduit. The surface texture does not surpass that of a glazed surface, but represents a great step forward in achieving such qualities in a concrete product.

Concrete pipe made at the Blue Island plant regularly exceeds, by 50 percent or more, the A. S. T. M. minimum strength requirements. On several occasions, pipe which was 48 hours old was tested under State supervision and found to be 50 percent stronger than specified. During a recent State supervised test in which minimum requirements were 12,000 pounds, an 18-in. reinforced culvert pipe 48 hours old tested 18,000 pounds.

Sewer pipe and conduit, made at this plant, are cured in one of four curing rooms which are 20 ft. wide and 70 ft. long. McCracken pipe carts are used in placing pipe units in the curing rooms, and a Barrett-Cravens jack lift truck is used in handling the racks of concrete conduit. Live steam at approximately 100 degrees F. is employed during the 48-hour curing period before placing the units out in the large storage yard for further curing. A minimum of chipped edges and breakage from handling has been observed in pipe made with fly ash.

The Illinois-Wisconsin Concrete Pipe Company at South Beloit, Ill., is one of the largest plants of its kind in the country and in it new trends and methods of product improvement are constantly tried out. A unique feature of this plant is that the company operates its own commercial sand and gravel plant in Beloit.

Company owned gondola type railroad cars are used to bring the aggregates, sand and Nos. 5 and 6 gravel into the plant. A rail-mounted steam shovel handles the aggregates from the cars to the two outside 3-compartment bins; there is one bin for each of the two buildings required to house the entire products operation.

A Link-Belt bucket elevator connects the outside bin of Building No. 1 with a Butler three-compartment bin located inside the building. Directly below this Butler bin are two C. S. Johnson weigh batchers and scales which are used in proportioning the mix before it enters a Blystone 22-cu. ft. batch mixer. This equipment is all part of the circuit supplying a No. 208 Quinn pipe machine, which is used in making pipe from 36 to 72 inches in size. A Shaw 2½-ton overhead crane handles the large sized pipe and forms.

Also housed in the first building are the stocks of reinforcing wire, a room where pipe reinforcing cages are fabricated, a 120,000-lb. pipe testing machine, a Universal tamp-

- **Left: A recently-installed pipe machine at the Illinois-Wisconsin Concrete Pipe Company, South Beloit, which will be used to make small sizes of pipe. It was used by the United States government in Puerto Rico.**
- **Right: A pipe machine at South Beloit which turns out 12-inch culvert pipe.**

ing machine for making concrete manhole blocks, and the Prestcrete slab fabricating and assembly line.

One of the major products of the South Beloit plant is a patented, precast unit of prestressed, reinforced, concrete slabs sold under the trade name "Prestcrete." The Prestcrete sections, 36 inches in length, are made on a McCracken packer head type pipe machine using steel forms or jackets designed by the Illinois - Wisconsin Concrete Pipe Company.

After the Prestcrete units are removed from the pipe machine, they are placed in curing rooms, jackets are removed, and live steam at about 100 degrees F. is used in the 48 hour curing period. Approximately 2,500 feet of Prestcrete tile can be made in 8 hours on one machine. Prestcrete slabs are an assembly of these precast units, the ends of which are accurately ground to provide a uniform bearing of the abutting ends. Grooves, near the bottom of the unit receive steel rods when slabs are made in various lengths up to 24 feet. The rods are threaded at one end and extend through thrust plates which are applied at each end of the slab. At one end of the slab, the rods and thrust plate are welded together, and at the other end, nuts are screwed onto the rods against the thrust plate and the steel rods are then prestressed with torque wrenches.

Cured sections are brought from building No. 2 to building No. 1 to be ground and assembled into specified lengths of slab; the maximum length being 24 feet. One of the unique features of these prestcrete slabs is that they are standard units which have been thoroughly cured before using. A Besly grinder is used to finish the end-faces of the sections before they are butted together. A Stone-Take-About saw is employed to cut sections into shorter pieces when slabs are made in odd multiples of 36 inches. Friction, roller type conveyor tables give this fabricating operation a product line output of 4,000 feet of slab per day. By means of these conveyor tables, finished slabs are fed through openings in the wall of the building to an outside storage yard.

The second building which houses the remainder of the pipe operation, is located just a short distance from the first building. The sand and gravel are transferred from gondola cars to the outside storage bins by the rail-mounted steam shovel. A bucket elevator handles the materials from the outside bins to the two 2-compartment bins within the building. An adjustable chute at the top end of the elevator permits charging either of the compartments of each bin. Directly below one of these bins is a pair of C. S. Johnson weigh batchers and scales which proportion the aggregates before entering a Stearns 42-cu. ft. batch mixer. This is all part of the supply circuit for a Model T McCracken pipe

- Top, left: This 2½-ton overhead crane at the Illinois-Wisconsin plant handles large pipe while the bell end ring is being removed.
- Top, right: An overhead crane loading Prestcrete slabs on a truck for delivery at South Beloit.
- Bottom, left: A three-fork power lift-truck (2,000 pound capacity) at work in the yard at South Beloit.
- Bottom, right: A truck-mounted hydraulic hoist is used to handle pipe and slabs on the job. (Illinois-Wisconsin Concrete Pipe Company.)

machine which is used in making pipe from 15 to 36 inches.

Below the second bin, a pair of volume type batchers are used to proportion the aggregates before they enter a Stearns 28-cu.-ft. batch mixer. The mix is then fed to a Model R McCracken pipe machine used in making 6- to 15-in. pipe.

Bagged cement is used in the mix for both of these machines and fly ash is also added in the ratio of 25 percent fly ash to the total amount of cement. The Prestcrete slab sections are made on the Model T machine at present but will also be made on the Model R in the future. The same ratio of fly ash-to-cement is used in the mix for the Prestcrete slabs. The surface texture and smoothness of the pipe and slab sections produced at this plant are typical of products in which fly ash is used in the mix. Because strength tests of these fly ash products have, in all cases, exceeded the A. S. T. M. specifications, 30 to 40 carloads of fly ash are used annually in the concrete mixes for all products produced at this plant.

Curing facilities in building No. 2 include six curing rooms 20 feet wide and 150 feet deep. McCracken pipe carts are used in placing uncured pipe and Prestcrete sections in the rooms. The two-day curing period involves thoroughly wetting the units with low pressure live steam and maintaining a room temperature of 110 to 120 degrees F. Further curing is effected by storing in the large, open storage yard. An Erie City Iron Works boiler, fired by a Detroit stoker, furnishes the live steam for all the curing rooms.

Although chipping and breaking is reduced in concrete products made with fly ash, the materials handling methods employed by the Illinois-Wisconsin Concrete Pipe Company have further reduced the possibility of damaging units and at the same time made possible a neat and efficiently operating storage system. Pipe under 36 inches are stored in a large yard north of the plant. Hyster power lift trucks, with a fork attachment, are used exclusively in storing pipe. With these power lift trucks, pipe can be placed in long neat rows, four or five high, or loaded onto flat-bed trucks for delivery. The yard layout is such that the lift trucks and delivery trucks are able to maneuver with ease.

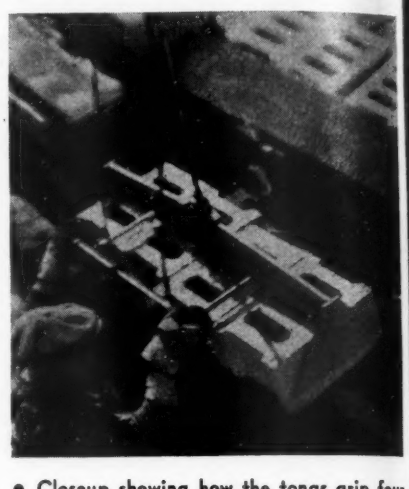
The storage yard south of building No. 1 is reserved for the larger sized pipe, Prestcrete slabs, and manhole blocks. An overhead P & H crane, running parallel to the south wall of building No. 1, is used to either store the finished slabs as they come from the building on friction roller conveyor tables, or to load them onto trucks for shipment.

Five semi-trailer type trucks, two with a 20-ton payload capacity and three with 12-ton payload capacity are operated by the company. In addition to these and contractor owned trucks, the company regularly hires common carriers to deliver its products to the job. For handling pipe and Prestcrete slabs during installation, the company operates a Chevrolet truck on which is mounted a Milwaukee Model H-2 hydraulic hoist. A crew of 55 men is required when the entire plant is operating at peak production.

Yard Hoist is Labor Saver In Concrete Products Plant

Louis Gelbman, well known in the concrete products industry for his many inventions and other contributions to its technology, has also developed Gelbmatic yard hoist which has been a great labor saver at his Concrete Units, Inc., plant at Hunt's Point, The Bronx, N. Y. First developed for yarding blocks this hoist has also been used for loading barges. It is now also being mounted on trucks for loading at the yard and unloading at the job.

For yard use the hoist is mounted on a structural steel framework so designed that it can be moved about by lift trucks. On this framework

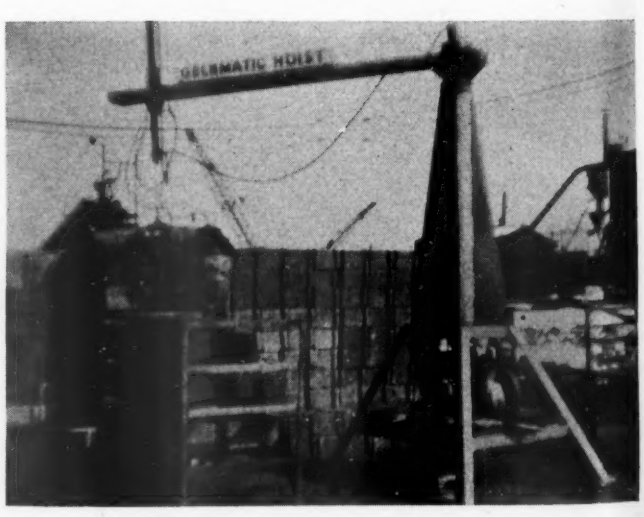


• Closeup showing how the tongs grip four 12-in. blocks

is mounted a Briggs & Stratton gasoline engine and a 50-c.f.m. compressor which operates the main cylinder of the hoist. In the yard it has a clear lift of 10 feet. For use on a truck this base is removed and the 2-foot-square mast of the hoist is fastened to the truck bed. The necessary air is obtained from a power takeoff compressor.

The hoist has a 12-foot boom which is swung manually and the lifting mechanism on a trolley is also moved manually. The lifting piston or cylinder on this trolley operates the lifting fork which has a tongs action and picks up six 8-inch blocks or their equivalent at one time. This piston is folded into the boom in transit so that the overall height comes well within the 12½-foot city clearance limit.

• Below: Two views showing mountings for truck and yard applications of the hoist.

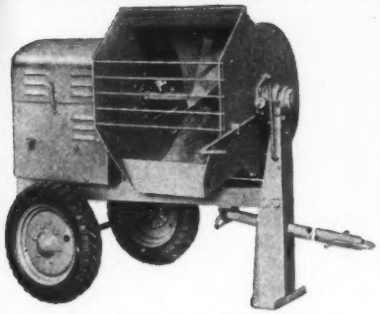


NEW MACHINERY and SUPPLIES

● Batch Mixer

Batch lots of mortar or plaster can now be made up in four or five minutes by one man with the Rex No. 6 mortar and plaster mixer, according to the manufacturer, the Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis.

The low charging height of the machine, 47 inches, is claimed as an advantage; and the Rex "Handi-dump" grill enables the operator to charge the drum without danger while the blades are turning. The mixer is powered by a 4-hp. gasoline engine, which is governor controlled and protected from dust. The blades of the mixer are made of structural steel and have hardened steel scrapers to assure a clean drum after each discharge.



Mixes mortar and plaster.

Sealed bearings protect the blade shaft against misalignment and help to keep the blades true. The machine discharges easily, and the "Restricto-lip" discharge prevents undue splashing. The blades can be started or stopped quickly by a simple control within easy reach of the operator. The Rex No. 6 is mounted on five-leaf cantilever springs, and rides on either 5.00 x 15 rubber tires, or 24-inch steel wheels. The tongue is telescopic and is adjustable, high or low, for truck or car hitch.

● Concrete Brick Maker

The model 750 "Vi-Brik-Crete," with model 520 hopper, has been designed to fill a gap in the range of products equipment available to concrete products manufacturers. Made by the R. S. Reed Corp., 36 Hoffman St., Three Rivers, Mich., Vi-Brik-Crete is a high-production machine designed to make fine bricks at the lowest possible cost. Its operation is based on the fluid characteristics of concrete when subjected to vibration of correct velocity and amplitude. Rigidity of machine structure and simplicity of design, together with the multiple molding capacity (7 brick), are the keys to lower manufacturing costs and large capacity, according to the company.

The brick are molded on plain pallets of wood or steel, and upon com-

Giving Loads the "Brush-Off"
with a
TOWMOTOR UNLOADER

Here's mechanical handling, from a fork lift truck, that completely eliminates manual unloading of stable loads. The Towmotor Unloader saves time and labor by unloading an entire load with a single, sweeping motion.

Newest of the Towmotor Accessory Group, the Unloader cuts carloading time 50%, permits placing of loads anywhere, with or without pallet. Does not interfere with normal lift truck operation. Screen height and length of unloading stroke furnished as required. Installed at the factory, the Unloader is available for use with most new Towmotor models. Towmotor Corporation, 1228 East 152nd Street, Cleveland 10, Ohio.

SEND FOR SPECIAL BULLETINS DESCRIBING THE TOWMOTOR

UNLOADER • UPENDER • SCOOP • CRANE ARM • RAM • HOPPER
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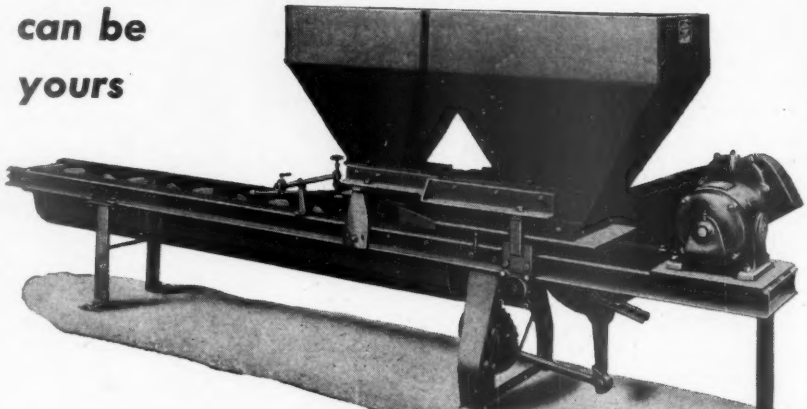
THE ONE-MAN-GANG
FORK LIFT TRUCKS *and* TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Continuous
PROPORTIONING and CHARGING
Continuous
MIXING and DISCHARGING
Continuous
PRODUCTION and PROFITS

can be yours



with the

KENT Continuous MIXER

Phenomenal production at lower costs has been obtained by American industry through "straight line" manufacturing.

Similar results have been attained for many years in concrete products manufacturing largely through the efficient aid of the Kent *Continuous* Mixer.

With other machines capable of practically continuous cycle operation the installation of a *Kent Continuous Mixer in the line removes the bottle-neck that often exists.

More accurate control of mix proportioning, blocks of more consistent uniformity, and an increase of output at lower cost are obtained as less labor is needed for operation.

A reciprocating plate feeds cement and sand into the trough. There it is dry mixed approximately one-third of trough length when the "positive water control" system begins adding an even amount of water in proportion to mix desired. Thoroughly mixed concrete moves forward continually and is discharged into a reserve hopper or the block machine.

The proportion of cement to sand is easily and widely variable as is the frequency and length of stroke of the feed plate to change the volume of output, as desired.

Every progressive cement products manufacturer should write for the literature offered below and become familiar with the advantages of this widely popular and thoroughly proven machine. Send the coupon.

For those whose conditions or preference require it, Kent also manufactures an advanced type of batch mixer.

The KENT MACHINE COMPANY
Manufacturers of CONCRETE PRODUCTS MACHINERY *Since 1925*
CUYAHOGA FALLS, OHIO, U.S.A.

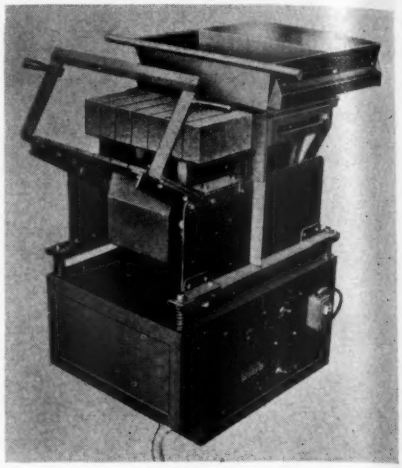
Send complete information and prices as checked below.

☐ **Kent Continuous Mixers** ☐ **Kent Batch Mixers**

Name ..... **Address** .....

City .....

pletion of the vibration and molding they can be removed from the machine on the pallets for curing. The machine will reportedly produce 28 concrete bricks a minute, all of a uniform size and density, with smooth finished sides, and sharp edges and corners.

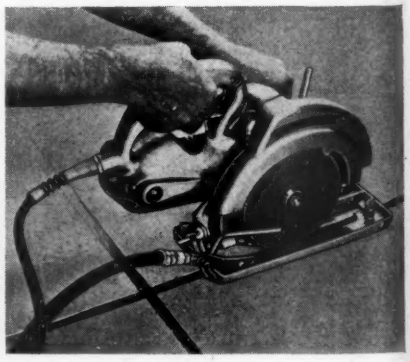


Concrete brick machine.

A heavy-duty vibrator capable of 3,600 vibrations a minute is foot-switch-controlled for immediate full power action without over-travel, insuring a short molding cycle (15 seconds). A built-in electronic control allows the operator to vary the amplitude of vibration while the machine is in operation. Power consumption is low input 300 watts, 7 amps., 110 volts, 60-cycle single-phase current. Operation does not require skilled labor. The mold box may be converted to produce units of double or triple brick size, or larger.

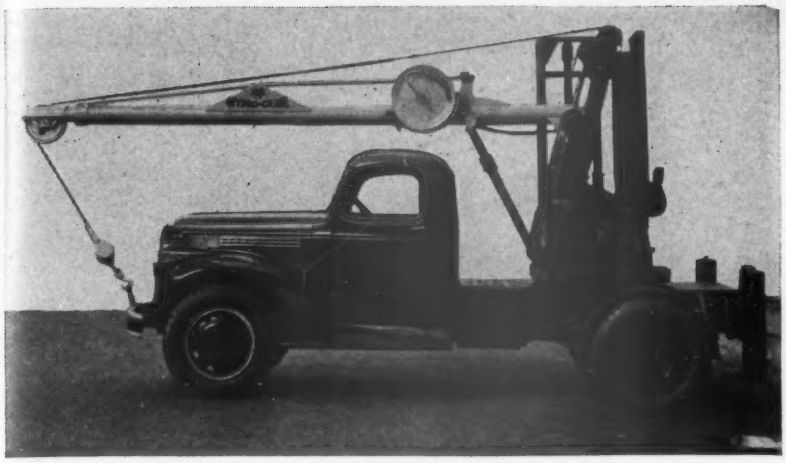
● Stone Cutting Saw

Two models—"A-8" and "A-9"—of the multi-purpose portable electric saws, produced by Fred W. Wappat of Mayville, N. Y., are now available for the concrete products industry. Either model may be used for cutting stone, brick, gypsum planks, composition building blocks, cement-asbestos sheets, pipes, and insulating board, concrete floors and walls and concrete blocks.



Cuts concrete blocks.

Various types of blades are available for particular cutting jobs. The A-8 takes an 8-inch blade, weighs 19 pounds, and operates at 3600 r.p.m. free speed; the A-9 takes a 9⅝-inch blade, weighs 22 pounds, and operates at 3400 r.p.m.



• Above: Truck-mounted hydraulic-powered crane for handling concrete products.

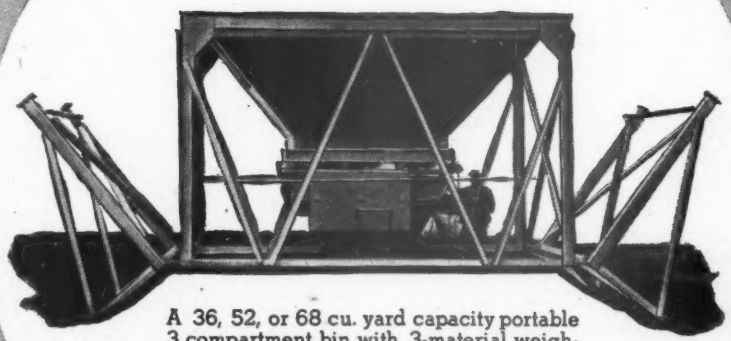
• Two-Ton Hydraulic Crane

The Milwaukee Hydraulic Corp. has in production the Model H-2 two-ton "Hydro-crane," which is a new development in the crane and excavator industry. The Hydro-crane employs full hydraulic control for every operation, eliminating all gears, clutches, brakes and drums. A simple high-capacity hydraulic system operates the entire unit, including boom, hoist, swing and clamshell bucket or crane hook. The standard tubular boom raises, lowers and telescopes, from 16 to 22 feet, under hydraulic power, enabling the operator to spot loads quickly and accurately, and to reach into box cars, over walls and piling, between beams, or into buildings. A full 360 degree swing is provided.

Stability is assured by means of outriggers, also hydraulically powered, which can be extended or retracted horizontally or vertically in 3 to 5 seconds, using controls at the driver's seat. The Model H-2 mounts on 1½-ton trucks, or special 6 x 6 drive Jeeps available at the factory. For clamshell service a standard ¼-cu.-yd. bucket, hydraulically powered, is available, as well as a hydraulic low-headroom bucket for congested quarters.

The Hydro-crane was designed for

ERIE TYPE "G A" PORTABLE AGGREMETER PLANTS



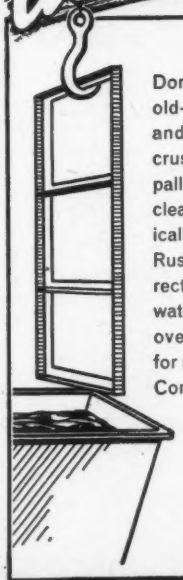
A 36, 52, or 68 cu. yard capacity portable 3 compartment bin with 3-material weighing AggreMeter is the answer to the need for a sturdy economical batching plant that follows the job. These are available with wide hopper to discharge batch into compartment trucks or with special truck mixer charging hoppers. Hinged legs provided for quick erection in field. Write for Bulletin GA-1 for details.

ERIE AGGREMETER PLANTS

Erie Steel Construction Co., 366 Geist Rd., Erie, Pa.

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

New CONCRETE REMOVER CLEANS FORMS Chemically



Don't waste time and labor in old-fashioned hand scraping and chipping. Concrete encrusted forms, block machines, pallets and tools can now be cleaned easily, quickly, chemically. Simply immerse in Nox-Rust Concrete Remover per directions, then rinse in clear water. Clean forms and tools overnight—have them ready for use next morning. Nox-rust Concrete Remover works like magic; (1) loosens and dissolves cement, (2) does not harm wood or steel, (3) is economical and labor saving. Send coupon for full details.

NOX-RUST CHEMICAL CORPORATION

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Please send me full information on your new Concrete Remover.

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THE SALSBURY TURRETEER

RELIEVES 3 TO 5 MEN

- One Turreteer will do work of 4 to 6 men—quickly pays for itself.
- One truck will handle output of two blockmaking machines.
- The Turreteer is unusually fast (up to 8 m.p.h.), maneuverable, rugged, stable.
- Power plant and drive wheel are a single unit. Turret revolves to change direction.
- Articulation smoothes out the bumps.
- Four wheels under load at all times.
- Capacity: 4000 lb. load plus driver. Will negotiate steep ramps.

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A subsidiary of Northrop Aircraft, Inc.

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NEW HOPPER SPEEDS MOLDING

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- FOR QUALITY CONCRETE BRICKS
- EASY TO OPERATE
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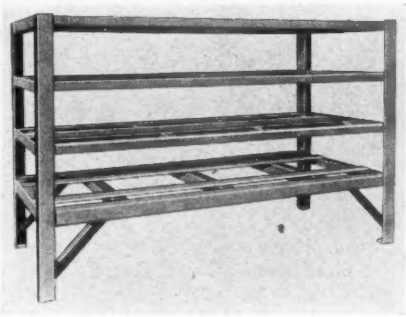
ALSO MANUFACTURERS OF THE
LITTLE DAVE *BRICKMAKER*
LOW COST HAND OPERATED MACHINE

R. S. Reed Corporation
EAST HOFFMAN ST.
THREE RIVERS, MICHIGAN

small-scale jobs, formerly requiring hand labor because of the prohibitive cost of large crawler or truck cranes. It has been used successfully in moving concrete units, such as concrete pipe and joists.

● Steel Racks

Five types of steel racks for standard concrete blocks are available from the Moffat Steel Co., 1621 E. Fourth St., Bethlehem, Pa. The racks which are made of structural grade first-quality steel, are furnished with three or four decks. Capacity varies from 48 blocks to 72 blocks, depending on the number of decks and the type of pallets used.



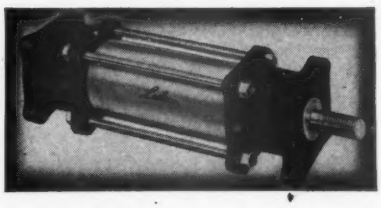
Three-deck rack for block.

They are available without the removable steel decks, and in this event the customer supplies his own 2-inch plank decks.

Illustrated is the Type C rack, with four decks, which holds 64 concrete blocks of 8 by 8 by 16 inches in size.

● Heavy-Duty Cylinder

The Engineering Products Company, 1600 S. San Pedro Street, Los Angeles, has made available the "Ledeen Heavy-Duty Cylinder," which reportedly will operate by air, oil or water. The unit is made in one standard basic design having five standard diameters and stroke lengths. Each is available with four types of rod connections and six types of head mountings.



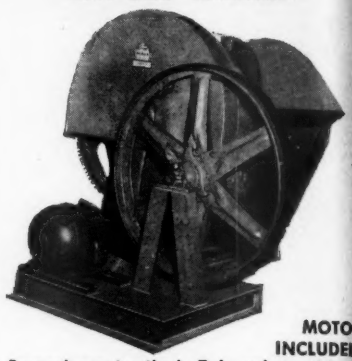
Multi-purpose cylinders.

These cylinders are in service on jobs involving tilting and straightening dump trucks, steering tractor cranes and shovels, loading and unloading skip hoists, actuating stands in dust recovery, on concrete-block machines, and dumping concrete mixers.

Further information and literature may be obtained by writing the company, referring to this description in the CONCRETE MANUFACTURER section of PIT AND QUARRY to assure the receipt of pertinent information.

CONCRETE BLOCK *Manufacturers*

IMMEDIATE DELIVERY ON JAY-BEE MIXERS!



MOTOR INCLUDED!
Rugged construction! Twin spiral mixing blades! High quality steel cut gears! Regulated discharge! Visible mixing! Job-tested design! 12 to 24 cu. ft. sizes. Other sizes to your specifications. ORDER NOW!

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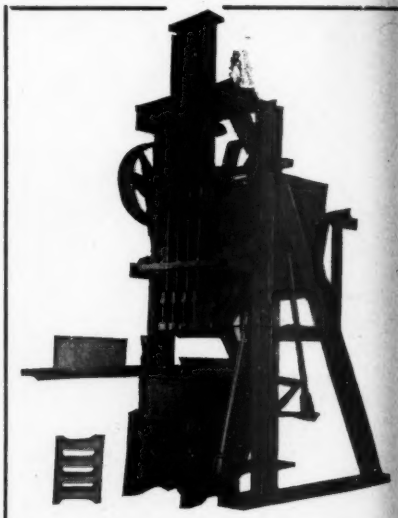
Write for Details and Price List Today!



An All-Purpose Machine

The Junior Stripper will turn out more blocks per man than any other hand-operated machine on the market . . . 200 per hour being easily maintained! Nor has quality of output been sacrificed for the sake of speed. Units are uniformly dense, true to shape, of uniform texture.

Stearns Clipper Stripper Machines; Stearns Joltcrete Machines; Stearns Mixers; Cast iron and press steel pallets. Straublox oscillating attachments, etc. Repair parts for: Anchor, Stearns, Blystone Mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
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